Using Discrete Choice Modelling in the Marketing of Higher Education in the North East of England

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PhD

2011

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A thesis is submitted in partial fulfilment of the requirements of the University of Northumbria at Newcastle for the degree of Doctor of Philosophy

Research undertaken in the Newcastle Business School

June 2011

Abstract

Since 1952 students at English universities have received grants towards covering the cost of their university education. Nevertheless, in September 1998, students for the first time were expected to contribute towards the cost of their undergraduate education in the form of tuition fees. More recently, the student contribution has increased to the point where in 2012 students will be paying a major contribution to their undergraduate tuition fees and by many people may be considered as 'customers' of education.

The aim of this marketing thesis is to investigate how 'Discrete Choice Experiments' provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education. To do this, it introduces the marketisation of the English Higher Education sector, and explores the consumer behaviour literature in the areas of student choice and consumer reservation price. Whilst the attributes that influence student choice of university have been explored, explicit research has failed to use discrete choice theory to examine the attributes that influence choice of course. Furthermore, despite the practical importance of knowing how much prospective students would pay for their undergraduate course, there remains limited research into estimating consumer reservation price in the marketing field.

This thesis establishes a preliminary model which provides a greater insight into the attributes and levels that have a significant influence on student choice of course. This model is then used to underpin the primary research conducted within this thesis using a discrete choice experiment. The sample population was Years 12 and 13 students based at two North-east secondary schools. Although the study was restricted to only focusing on the North east of England, findings reveal students are willing to pay more for degree course that have better access to good quality student accommodation and have a higher number of teaching hours. This suggests that universities that offer newly refurbished accommodation and offer greater levels of contact time could justify charging higher fees. Based on the findings of the discrete choice experiment the contributions to theory and methodology of this thesis are the development of a checklist containing the factors to consider when constructing a discrete choice experiment along with the application of a discrete choice experiment contextualised for the English Higher Education sector. Moreover this provides a basis for future discrete choice experiment research in the marketing field.

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Glossary of Terms

An **Alternative** is an option containing different attributes and levels

Attributes is can be described as the different characteristics that make up an alternative

A **choice set (or profile**) contains a unique set of attributes and levels

The **Conditional logit model** is well known for analysing multinomial designs that combine case specific and alternative specific variables.

The **constant** value represents the general level of preference to do something e.g. enrolling onto a full-time undergraduate degree programme.

A **Continuous variable** is a variable that can take an unlimited level of values

Discrete choice experiment (DCE) is an experimental methodology that elicits consumer preference based on the attributes that make up a product.

A **Dummy variable** can be described when a level of an attribute takes the value of one and all other levels are given the value of zero.

Experimental design can be described as the specification of a finite set of attributes and levels

Effects coding are used for measuring nominal variables. The lowest value of an attribute is omitted and coded -1 in order to measure the results from a DCE.

Goodness-of-fit contains a number of tests to measure the significance of the probability models used to estimate the regression data from a DCE.

Gumbel distribution assumes random variants contained within a utility function are independent and identically distributed

Levels are the various values (qualitative or quantitative) of an attribute

The **Logit model** is a probability model that is used to compute data following a binary design and assumes random variants are Gumbel distributed.

The **Natural Logarithm or (*e*)** represents an irrational constant to the approximate value of 2.718281828

Nominal scaled data contains attributes and levels but the levels observed are assigned unique values that do not provide any suggestion of order

An **Observation** represents an individuals' choice made within a choice setting

Orthogonal means there is zero correction between the variables

Orthogonal main effect plan an orthogonal design made up of a finite set of attributes in which only the main effects are calculated due to other interactions being considered insignificant

Payment vehicle is individual's method of payment that produces a hypothetical measure of respondents' reservation price

Pseudo R^2 is frequently used as part of discrete choice experiments to discover how well a model has estimated the data

Random Utility Theory (RUT) assumes consumers are utility maximises however part of their preference is random and therefore unobservable

Utility can be defined as the desirability of a good or service

List of abbreviations

DCE Discrete Choice experiment

HE Higher education

Acknowledgements

I would like to offer my thanks to the schools and students that took part in this study. Their voluntary participation in this study was very much appreciated. In addition to this I would like to offer my thanks to my supervision team; namely, Professor Teresa Waring and Mr Nigel Coates for their continuous support and guidance. Indeed a special thank you has to go to Prof. Peter Slee for the time he has made available to oversee this project; for that time I am exceedingly grateful.

On a personal note, I would like to thank my parents, Michael and Geraldine, and sister, Jessica, for their endless encouragement and letting me live rent free whilst undertaking this theoretical journey. I am also grateful to Prof. Mandy Ryan and Dr. Verity Watson at the University of Aberdeen for their support whilst developing my understanding of Discrete Choice Experiments. The time they made available to verify my results was extremely generous. Furthermore, I would also like to thank discrete choice experiment founder, Prof. Jordan Louviere, for his guidance in positioning this thesis. It is often recognised that researching consumer choice is extremely difficult due to the number of contributions that are positioned outside the marketing literature. The time spent with Jordan in Frankfurt was invaluable in theoretically positioning this study. Furthermore, a massive thank you has to go to my girlfriend, Caroline, who has supported my studies from start to finish. Her continuous enthusiasm and understanding when I had to work so many weekends has been outstanding. Caroline is extremely special and I promise we can now spend some more time together!

Undertaking this PhD has provided me with the opportunity to make some really special friends. I would also like to thank all of my Graduate Tutors colleagues for their support and friendship, especially Dr. Naomi Kirkup, Dr. David Hart, Dr. Fiona Robson, Dr. Jannine Williams and Dr. Nicola Patterson. Outside work I would also like to thank my good friend Richard Walters. Richard has been an excellent friend over the last 4 years and his support is much appreciated. I would also like to thank Anne Elliott for her time spent proof reading the document. Finally, deciding to undertake a PhD whilst suffering from dyslexia was never going to be easy. The support I have received throughout the last 4 years from the university and through my faith has been invaluable.

Author’s declaration

I declare that the work contained in this thesis has not been submitted for any other award and it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the School Ethics Committee / University Ethics Committee / external committee.

Name: Matthew William Sutherland

Signature:

Date: June 2011

Chapter One

Background and introduction

1.0 Introduction

This chapter provides a general introduction to the PhD thesis. Initially, the background to the study is outlined acknowledging the recent changes affecting English universities. This is followed by the rationale to the theoretical concepts of student choice and consumer reservation price. From here, a brief overview of the methodology is presented before outlining the researchable question and research objectives. The significance of the research is recognised before concluding with an outline of the forthcoming chapters that make up the thesis.

1.1 Background to the study

This section gives a brief history of English Higher Education (HE) that led to the introduction of tuition fees.

Since the 1940s research has been commissioned to examine English universities and the English HE sector. Early research by Lord Barlow focused on 'access' and 'funding' of English universities. In fact the Barlow Report published in 1946 revealed that research began as the means of exploring how to increase the number of ex-servicemen who may have been denied entering HE between 1939 and 1945 (Great Britain. Ministry of Education, 1946) into enrolling into English universities. Morris (1963) highlighted his support for the expansion of the HE sector, although warned about the vast amount of government expenditure required in order to grow the English university system. Indeed, a 1972 white paper published by the department of Education and Skills acknowledged the dramatic rise in demand for English universities. Once again, research was conducted in order to review the number of potential funding scenarios for English universities (Moore, 1987). Nevertheless, English universities responded,

acknowledging any reduction in funding of 2.5% or more would cause massive disruptions to the service they could provide. In 1985, demand for English universities was forecast to rise to between 556,000 and 612,000 by 1989/90 (Great Britain. Department of Employment and Manpower Services commission, 1985). This promoted the publishing of the Jarratt report in 1985. The aim of the report was to study the level of efficiency in university management. This involved interviewing senior university policy makers in English universities. The main recommendation was for the British Government to provide more transparency about the rates of funding, suggesting mounting interest in the funding mechanisms supporting the English HE sector (Great Britain. Committee of Vice-Chancellors and Principles, 1985). By 1972, the British Government acknowledged that they would increase inward investment, pledging an additional £12 million to improve the expansion of polytechnics. However in 1991 a Government White paper reported an end to the binary policy (polytechnics and universities) in an attempt to reduce Government investment by developing a single HE sector (Great Britain. Department for Science and Education, 1991).

Consequently, much of the previous research published in the 1990s examined the means of improving private investment. Recommendations from the Dearing Report, published in 1997, revealed that full-time undergraduate students should pay a proportion of teaching costs, through the form of a tuition fee (Great Britain. Department for Education and Employment, 1997). Recommendations from this review led to the introduction of tuition fees in 1998. However, a report published by Universities UK (2007) suggested that introducing tuition fees didn't have a negative effect on demand for university education, with the number of degree accepted applicants between 1998 and 1999 increasing by 2% (a more detailed explanation of the impact of charging fees on HE market is provided in Section 2.1). An equally large challenge was to maintain this investment. Future research was commissioned in the form of a White paper published in 2003 that examined

the future of university education. The main finding from this study recommended English universities should have the freedom to set tuition fees up to a maximum of £3,000 per year (Great Britain. Department for Education and Skills, 2003). Palfreyman (2004) supported the idea of 'top-up fees', claiming it would create much needed investment into English universities. Indeed, in September 2006 one hundred and twenty two of the one hundred and twenty four English universities increased the price of tuition to £3,000 per year (Times Higher Education, 2008). Findings from a Higher Education Policy Institute (HEPI) (2006) report suggested that despite the rise in the price of fees, the number of students enrolled in English universities increased by 4%, suggesting continuing demand for English universities. Nevertheless, in 2006, Lord Browne was commissioned to evaluate the success of top-up fees and to consider the long-term financing of English universities. In his report, Browne (2010) was quick to highlight the important role English universities have in the broad population, with skilled and highly trained graduates directly improving the nation's competitiveness (Chapter 2, Section 2.1 provides a more detailed discussion about the type of people who are now interested in HE). However, in presenting his report Browne (2010) urged the need to transform the way English Universities operate and are funded in order to ensure that undergraduate provision at English universities is sustainably financed. In an attempt to restore funding levels in English universities, Lord Browne recommends the removal of the fee cap. The main benefit of removing the cap would allow English universities to secure additional funding. However, the reactions to Lord Browne's proposals were mixed. Senior university policy makers at some older universities (such as Cambridge, Oxford and University College London) welcomed the proposed increase, reporting that raising the fee price is essential, as it costs up to £9,000 a year to educate each individual student (Collins, 2010). However, the government responses were varied. The HE minister David Willets MP suggested that the removal of the fee cap would be difficult to manage (Garner, 2010). Yet,

surprisingly Liberal democrat MPs reported not being against the increase in fees, but rejected the need to completely remove the fee cap (Riddell and Kirkup, 2010). Nevertheless, on Thursday 9th December 2010 behind wide scale protests and rioting on the streets of London, ministers met to vote on increasing the price of tuition fees. Later that day, politicians voted to increase the price of tuition fees from September 2012 to £9,000 per year.

Today, it is becoming increasingly important for English universities to make informed choices about the allocation of scare resources. Across the world, governments have been involved in massive borrowing programmes as a result of the 2008 global economic crisis. In the 2011 spending review, the British Government cut funding to universities by £940 million in an attempt to repay the government deficit (Great Britain. Her Majesty's Treasury, 2010). Immediately, this led English universities to recognise the importance of attracting and enrolling prospective students onto their undergraduate programmes in order to protect revenue (the way English universities operate is discussed further in Section 2.1). Browne (2010, p. 29) describes how: *"students will control a much larger proportion of the investment in higher education. They will decide where the funding should go; and institutions will compete to get it"*. One way English universities could secure demand is through understanding what attributes (or characteristics) of an undergraduate degree course could have positive influences on student decision making behaviour. Thus, meaning there is a perceived need to understand more about the attributes that influence student choice as well as understanding the monetary values attached to these attributes.

The above discussion has highlighted two issues that are of particular importance to English universities. These are 'student choice' (how more can be done to estimate the attributes that influence course level decision making behaviour) and consumer reservation price (to discover aggregately how much students will pay for an undergraduate degree course). It is, therefore, clear that more research is

required on identifying the attributes that influence student choice along with the approaches to calculating student reservation price. Detailed understanding of these two concepts would provide rich data that could be useful to university policy makers to market their courses strategically, in order to attract and retain prospective students.

On a personal level, interest into student choice and tuition fee pricing first came about whilst on an industrial placement year in Northumbria University's Central Marketing Department. This highlighted the theoretical importance of understanding how much prospective students would pay for their undergraduate degrees. In fact, this research proposal also stimulated interest with the then Deputy Vice Chancellor for 'Staff and Student Affairs', Professor Peter Slee. Peter was also interested in understanding more about student choices and their reaction to changes in tuition fee pricing. Nevertheless, researchers have yet to explore student choice and consumer reservation price in the context of English HE, a point that is highlighted in Section 1.5 when discussing the significance of this research.

1.2 Rationale for theoretical approval to the study

This section presents a brief overview of the literature on student choice and consumer reservation price. Core themes are drawn from the two bodies of literature in order to provide an introduction to the theory.

1.2.1 Consumer choice (Chapter 2)

In the English HE sector the influence of marketisation (the process that enables state owned enterprises to adopt increasingly market-based principles - as discussed in Section 2.1) is acknowledging an increasing number of universities to treat 'students as customers' in order to take a proactive approach to understanding student decision making behaviour. This has led to growing interest in the area of consumer behaviour. Traditionally, most contributions to consumer behaviour are based around the consumer decision making process

(Chapman, 1986; Kotler, 1997; Moogan, Baron and Harris, 1999; Moogan and Baron, 2003). One area in particular that is receiving growing attention is the component 'choice' (Horowitz and Louviere, 1995; Louviere, Hensher and Swait, 2000; Adamowicz, Bunch, Cameron, Dallaert, Hanneman, Keane, Louviere, Meyer, Steenburgh and Swait, 2008; Kotler and Keller, 2009; Fiebig, Kean, Louviere and Wasi, 2009 and Mueller, Lockshin and Louviere, 2010). It is often the case that the attributes that make up a product or service provide a mechanism to evaluate consumer choices. It is, therefore, in the best interests of businesses to know which attributes are more likely to have an influence on consumer choice and thus more likely to impact the consumer buying decision.

Chapter two begins by providing an introduction to the process of marketisation that has been incorporated into the English HE sector. From here the five stages of the consumer decision making process are reviewed with an emphasis on choice. Indeed, Peter and Olson, (2001) argue that discrete choice theory provides a theoretically robust approach to estimating the attributes that influence consumer choice. This approach will be discussed further in Chapter Two.

1.2.2 Student choice and student reservation price (Chapter 3)

As previously discussed (in Section 1.1), in the publicly funded HE sector it is becoming increasingly important to attract and retain prospective students. Yet, research into student choice of course is still at a very early stage, having hardly progressed since first being researched in 1998 (Foskett and Hemsley-Brown, 2001; Maringe, 2006; Maringe and Carter, 2007 and Foskett, Dyke and Maringe, 2008). Chapter Three begins by providing an introduction to student choice research. A review of the extant student choice literature identifies that there are a number of problems with the approach taken by existing research when measuring the attributes that influence student choice of course. Nevertheless, Briggs (2006) suggests that the way forward may be to investigate discrete choice theory (as discussed in Section 2.3) as an alternative and a more robust

approach to developing a predictor for undergraduate choices. Thereby providing a foundation to discuss the role of consumer theory and the attributes when estimating consumer reservation price.

Given the increasing need to understand how changes in price impact on student demand (as highlighted in Section 1.1) requires appropriate theoretical methods to be developed. In consumer behaviour, typical approaches of evaluating consumer choices are revealed through estimating their reservation price (Breidert, 2006). To date, current approaches to estimating students' reservation price have targeted first year undergraduate students, leading to the publishing of student reservation price figures for observable market data (OpinionPanel, 2010). However, the process of applying for universities typically requires students to construct preferences for products that they have never experienced. This has led to alternative theoretical approaches being developed to predict student choices for non-market goods and services. These techniques are known as stated preferences and include indirect surveys of conjoint analysis (Green and Srinivasan, 1978 and 1990). Stated preferences methods can be described as a measure of consumer choices for hypothetical goods and services (Louviere *et al.* 2000). Monetary methods of stated preference include Conjoint Analysis, Discrete Choice Experiments ('DCE') and Contingent Valuation. A thorough review of these three approaches is outlined in the remainder of Chapter Three in order to discover the most appropriate approach to calculating the monetary values for the attributes that make up full-time undergraduate degrees.

1.3 Research methodology (Chapter 4)

The underpinning epistemological approach taken for this research is that of intersubjectivity. Morgan (2007) describes intersubjectivity as allowing researchers to believe in the real world by its approach that all individuals have their own unique interpretations of that reality - a view that Crotty (1998)

recognises as being in line with the functional approach to research known as pragmatism.

Pragmatism can be seen as an alternative approach to abstract and rationalistic science (Rocco *et al.* 2003). Goldkuhl (2004) describes how the fundamentals of pragmatism concern 'what works best' in a research environment, therefore placing less emphasis on understanding the total truth and instead focuses on the allocation of resources that will deliver the best results. In the light of this view, Tashakkori and Cresswell (2007) argue that when conducting research, analysts should base their research strategy on a realistic approach to undertaking social science research. More specifically, for the purpose of this study, this identifies data on the attributes that make up an undergraduate degree course which are quantified for the purpose of developing meaning about the students' underlying utility (as discussed in Section 2.3). In the light of this approach, Louviere, Hensher and Swait (2000) argue that utility is more commonly revealed through the development of an experiment.

Street and Burgess (2007) believe that experimental research provides a clear insight into the relationship that exists between attributes when choosing a product or service. Furthermore, experiments benefit from a high degree of internal validity, further reducing the threat of bias. For the purpose of this study, a DCE was developed. This was used to examine the attributes that influence student choice of course along with their associated monetary values. Further detail into the research methodology and methods used in this research are presented in Chapter 4.

1.4 Researchable question and research objectives

The aim of this thesis is to investigate: *"How can discrete choice experiments provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education?"*

In order to answer the question this thesis will:

1. To explore consumer behaviour theory in relation to decision making and outline the underlying principles of discrete choice theory (Chapter 2)

2. To critically review the student choice literature to explore the attributes that influence student choice and examine whether the development of discrete choice modelling would provide a theoretical alternative approach to using rating scales when estimating course level decision making (Chapter 3)

3. Review the literature on estimating consumer reservation price and propose an alternative approach to estimating student reservation price for the attributes that comprise a degree course (Chapter 3).

4. Develop a discrete choice experiment to indirectly elicit student utility for the attributes that comprise a degree course (Chapter 4).

5. Explore the attributes and levels that influence student choice of undergraduate degree course (Chapter 5).

6. Statistically analyse the findings taken from the discrete choice experiment in order to provide an insight into the student preferences and reservation price estimates in relation to the underlying constant (Chapter 6).

7. Critically evaluate the findings taken from the discrete choice experiment (DCE) together with the existing marketing literature in order to develop and present contributions from the study (Chapter 7).

8. Present the contributions from this study and comment on the implications of these findings in order to make recommendations for future work (Chapter 8).

1.5 Significance of this research

From fulfilling these objectives this research aims to contribute to the marketing knowledge in the following ways:

1. ***Through examining the attributes that influence course level decision making behaviour. Despite extant research focusing on access and means of stimulating private investment, this research has reacted to calls from Brown (2010) to identify the attributes that prospective students consider important when choosing a full-time undergraduate degree programme in England.***

2. ***Through the qualitative element of this research by furthering knowledge into the meaning of the attributes and their levels, which can be used in future choice research.***

3. ***Through constructing a theoretical model that presents the attributes and levels that influence prospective students' choice of degree course that provides a new insight into the factors that are most important when applying to university.***

4. ***By developing a DCE for this study it will attempt to satisfy the behavioural axioms of consumer choice when measuring course level decision making behaviour.***

5. ***By developing a DCE, as opposed to a rating scale approach that has dominated previous course level decision making, this study will attempt to estimate the monetary values attached to the attributes.***

6. ***Through the decision to develop a DCE this study will attempt to generate awareness of the benefits associated with DCE research. Whilst most DCE research has been developed outside the marketing field, this study hopes to provide a new insight into conducting*** **DCE research from a marketing perspective.**

1.6 Outline of thesis

The remainder of the thesis is organised as follows. **Chapter 2** begins by firmly positioning the thesis within the marketing literature providing an introduction to the theory of consumer behaviour. The various stages of the consumer decision making are further discussed before drawing specifically upon the component choice. The chapter concludes with an investigation into discrete choice theory. **Chapter 3** begins with a review of the existing student choice literature to determine how rating scales have been used to date as an approach to measure the attributes that influence choice of course. From here, the remainder of the chapter reviews the theoretical concept of consumer reservation price and examines the marketing literature to determine the most theoretically appropriate approach to measuring the monetary values for the attributes that influence prospective students' choice of degree course. **Chapter 4** outlines the theoretical perspective that delivers the direction of this thesis, with a detailed appreciation of the underlying principles of pragmatism. From here the rationale for the data collection is presented with an explanation of the construction of the DCE. **Chapter 5** presents the analysis from the preliminary focus group sessions and face-to-face interviews that formed the validation process, before reporting the attributes and levels used for the DCE. **Chapter 6** reports the results from the DCE in the form of the conditional logit and logit models. **Chapter 7** summarises the results and two models together with the existing literature to present contributions from the study. The thesis concludes in **Chapter 8** with a review of

original research question and contribution to knowledge to draw critical review to the thesis and highlights potential areas for future research.

1.7 Chapter summary

This chapter began by providing an overview of the English HE sector along with the recent rise in the price of tuition fees. From here the theoretical concepts of student choice and consumer reservation price were introduced in order to provide a foundation to the study. Thence the overall researchable question and objectives were reviewed along with highlighting the significance of this research. The chapter concluded by providing an outline for the remainder of the thesis. The next chapter introduces the theory of consumer behaviour that provides the theoretical basis for the thesis.

Chapter Two

Consumer choice

2.0 Introduction

The specific objective of this chapter is to explore consumer behaviour theory in relation to decision making and outline the underlying principles of discrete choice theory. The chapter begins with an introduction to the literature on marketisation and its impact on the English Higher Education (HE) sector. From here the theory of consumer behaviour along with the consumer decision making process are introduced. The five stages that make up the consumer decision making process are reviewed with the fourth stage (choice) being the focus of this thesis. The chapter ends with a deeper understanding of the mechanics of consumer choice. This is known as discrete choice theory and acknowledges a number of extensions to the traditional theory of consumer choice.

2.1 The marketisation of Higher Education

The following section sets the context of student choice with the marketisation of HE in England.

Marketisation is the process that enables state owned enterprises to adopt increasingly market-based principles, implying the concept of marketisation draws upon techniques that are more commonly used within private sector businesses (Jonathan, 1997; Slaughter and Leslie, 1997; Hemsley-Brown and Oplatka, 2006; Harvey, 2005 and Furedi, 2010). Jongbloed (2003) describes how the underlying purpose of marketisation for English universities is to improve quality and the mechanisms involved in student choice. Hemsley-Brown and Oplatka (2006) agree, arguing that by raising quality standards universities increase standards of achievements. The marketisation process also allows universities to draw from more market based approaches, allowing universities to

improve systems and reduce average costs. Consequently, universities that operate within a more market based environment can experience improved performance. Despite these favourable features, Naidoo, Shankar and Veer (2011) suggest the process of marketisation is a harmful process that increases levels of cognitive strain when students are constructing choices. Nevertheless, universities that operate in a more marketised market can become better at identifying and fulfilling student needs, implying that marketisation improves universities' overall competitiveness.

To date, much research by marketing academics into the marketisation of the English universities has been based on Clarke's (1983) triangle of coordination (as shown in Figure 2.1). Jongbloed (2003) describes how the triangle of coordination provides a framework that represents the growing popularity of marketisation research. Indeed, the framework can be used to provide a better understanding of how the HE sector is organised (Clark, 1983; Vught, 1989, Vught, 1995; Maringe and Gibbs, 2009). The framework begins by examining the role of academics and responsibility they take in educating their students. Sharrock (2000) describes how the relationship between academics and students is changing as the government expects students to be treated more like customers as they make a more direct contribution to the cost of their tuition. Following this, the role of the 'state' is explored. The role of the 'state' can be described as defining the role the government plays in running the HE sector. Furedi (2010) highlights how more recent studies have examined the financing of English universities (as discussed in Section 1.1). The model finishes by examining the role of the market and the impact of market-based thinking when running universities.

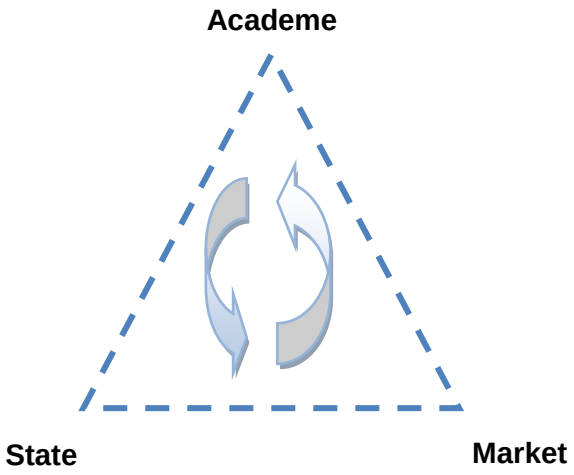


Figure 2.1: A framework for representing marketisation in the English HE sector (adapted from Clarke, 1983, p. 51)

For the remainder of this section the most cited theme within Clarke's (1983) framework will be reviewed. Jongbloed (2003) along with Molesworth, Scullion and Nixon (2009) have contributed to this debate by exploring whether students should be treated as customers. As mentioned in Section 1.4 this study is interested in student choice. Therefore, the existing research which examines 'students as customers' will provide useful insights and will allow this research to develop further.

2.1.1 Students as customers

Over the past few years, there has been increasing interest in redefining the relationship between academics and their students. Barnett (2010) describes how this debate began when English universities took the decision to start charging students for their tuition, implying that students were becoming consumers (Nordensvard, 2010) or in fact customers (Maringe and Gibbs, 2009; Heywood, Jenkins and Molesworth, 2010) of university education. Despite this rise, closer inspection of the literature suggests that very few studies actually clarify the difference between labelling a student as a 'consumer' or 'customer'. Barnett (2010, p. 43) agrees and argues that: *"a failure to make this distinction, and a consequent over-focus on the idea of 'consumer' as against 'customer' leads to*

some over-easy blows in the literature". In an attempt to clarify the terms he goes on to describe a 'consumer' as someone who consumes the service given to them, implying there is no need for the consumer to engage in a relationship with the provider. On the other hand, Molesworth, Nixon and Scullion (2011) describe a 'customer' as someone who extends their custom to the provider by drawing upon their own resources to make their purchase. For students enrolled at university Nordensvard (2011) supports Molesworth *et al.* (2011) view arguing how it is important to remember that when studying at university, students' main motivation is to form a relationship with staff in order to enhance their knowledge. Consequently the term customer will be used through this section.

Although, traditionally the term 'student' has been the most commonly used term in the literature (Morris, 1963 and Moore, 1987), since universities have taken a increasing market-based approach to running institutions there are a number of reasons why 'student as a customer' maybe a more preferred label. One of the most important benefits of labelling 'students as customers' is that it puts more emphasis on student choice (Newman and Jahdi, 2009 and Lowrie and Hemsley-Brown, 2011). Customers have needs and in order to satisfy their needs universities need to supply courses with the right attributes (or characteristics – as mentioned in Section 1.1) which are important when choosing a degree course. Thus, by understanding the attributes that are important when choosing a degree course this allows universities to design more tailored degree courses.

Thinking more specifically about the products universities produce, labelling students as customers has made universities re-evaluate the courses they offer. According to Clarke's (1983) framework, the role of the market is to supply the products demanded by its customers. When looking at studies that have researched 'students as a customer' relationship many have focused on the consumption of university education (Foskett and Hemsley-Brown, 2001; Oplatka and Hemsley-Brown, 2004; Maringe, 2006; Maringe and Gibbs, 2009;

Nordensvard, 2010 and Haywood, Jenkins and Molesworth, 2010). Many of these studies show a shift towards universities talking about product portfolios when discussing their undergraduate degree courses (Slaughter and Leslie, 1997; Foskett and Hemsley-Brown, 2001; Williams, 2010 and Nixon, Scullion and Molesworth, 2010). Foskett (2010) agrees describing university products to be produced by staff but require the effect of the customer to consume them, thereby reinstating universities' approach to market-based education.

Viewing 'students as customers' can also have a positive influence on quality. Now students have better access to information and student mobility has increased. This increase in mobility is putting mounting pressure on universities to provide current students with a high level of care (Scullion, Molesworth and Nixon, 2010). Furthermore, providing a high level of care gives universities more chance of securing students into postgraduate education.

However, despite these reasons there are a number of objections to labelling 'students as customers' of HE. The main criticism with labelling students as customers is its impact on social mobility. Many writers (Shattock, 2006; Shattock, 2008 and Marginson, 2011) consider HE to be a public good. This means that no member of society should be excluded or put off from attending university. However Sharrock (2000) argues that by treating 'students as customer' forces universities to think of HE as a private good, promoting quality and continuously evaluating their competitors. Consequently this shift is preventing many students from poorer income families enrolling at university and benefiting from living a better lifestyle. Newman and Jahdi (2009) go onto suggest that by labelling HE as a public good and ignoring the benefits of competition can restrict students' choices. For example students may only get the information about courses in their local area, thereby regionalising student decision making. The introduction of competition means students have better

access to information allowing them to make more informed choices which encourages them to choose a more suitable degree course.

Other weaknesses associated with labelling ‘students as customers’ are more related to learning (Star and McDonald, 2007; Molesworth, Nixon and Scullion, 2009; Neary and Hagyard, 2010). The underlying purpose of universities is to educate students. This involves effort from both academic members of staff and the students. However Barnett (2010, p. 46) argues, when labelling ‘students as customers’: *“students come to the view that his or her higher education can be bought much like any other product or service and absolves him or herself from much, if any involvement in the character of the experience”*. Nevertheless, Maringe and Gibbs (2009) have suggested four stages that universities need to consider when managing ‘students as customer’ relationship. The first stage is for universities to identify the needs of the students. Understanding students’ likes and dislikes allows universities to design courses that fulfil their needs; however students are continuously reminded that it is a joint relationship and that students need to deploy their own resources. Managing service quality is the second stage. By continuously accessing the service quality means that universities can access service quality periodically. However, students also need to attend university and a high service quality is not provided if students fail to engage in their course. Managing student satisfaction is the third stage. This ensures courses are delivered by teaching staff that are enthusiastic and are specialists in the area. The final stage is then to conduct periodic research into the aspects of labelling ‘students as customers’. The use of the four stage process helps universities who label ‘students as customers’ to make proactive steps to fulfilling students’ needs. However Maringe and Gibbs (2009) argue that the stages cannot work without the input of the student customer.

One other noticeable impact on labelling students as customers has been the increasing numbers of students enrolled at English universities. Reports

published by HEPI show the number of full-time students enrolled in English universities has risen by 78% over the last 20 years (Coleman and Bekhradnia, 2010). Foskett (2010) put's this increase down to universities accepting a broader range of students onto undergraduate degree courses, acknowledging more people were interested in studying alongside work commitments. Another influence on the rising demand for university education has been through businesses looking at universities to externally train their staff (Furedi, 2010). This increase in the variety of students has broadened the number of people interested in studying for a degree. Bolton and Nie (2010) describe anyone interested in these people as stakeholders of university education.

At it broadest sense stakeholders are any group of people who are affected by the actions of a business (Freeman, 2010 and Brodie and Glynn, 2010). The shift towards a marketised HE sector in England means that there are a growing number of non traditional groups of people interested in the way universities operate. These include the UK Government, parents, university staff, careers advisors and teachers. A detailed discussion of the core groups of stakeholders and their influence on student choice is provided in Section 4.2.1. However for the purpose of this study stakeholders are defined as anyone who influences students in the search process when evaluating the attributes they consider important when choosing a degree course.

Finally, the marketisation of the HE sector in England can be represented diagrammatically in Figure 2.2 and combines the arguments put forward in this section together with growth of HE in England as discussed in Section 1.1. Indeed, Figure 2.2 clearly shows (in orange) the introduction of market based principles into English HE sector.

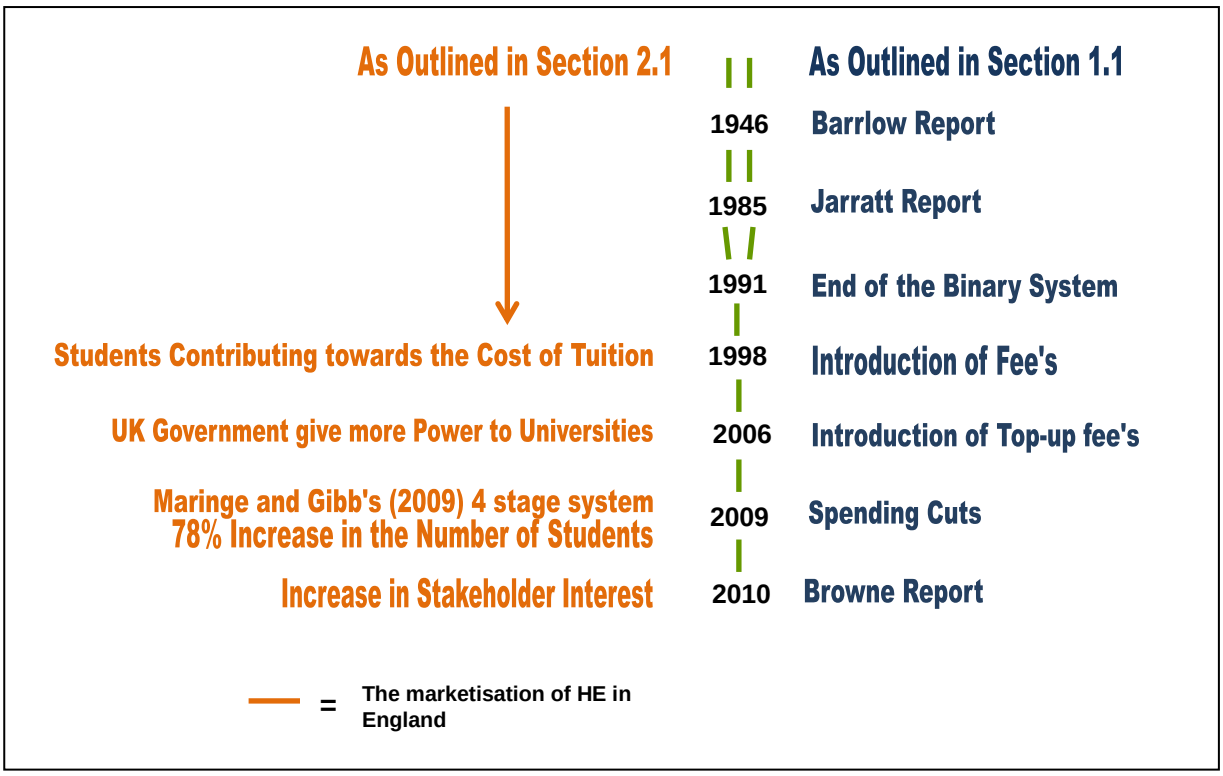


Figure 2.2: The expansion of marketisation in HE in England

In summary, it is clear that the view whether students should be labelled as customers of university education is mixed. Some writers, such as Sharrock (2000) believe HE cannot be treated as a private good, nevertheless it is becoming increasingly difficult to ignore the calls from leading writers (Morris, 1963; Moore, 1987; Maringe and Gibbs, 2009; Heywood *et al.* 2010) in the area that students should be labelled as customers of HE. Bolton and Nie (2010) have suggested that this is due to the increasing number of stakeholders who are also involved in evaluating the different attributes that are involved in choosing an undergraduate degree course. Having set the context we now consider the role of consumer behaviour in student decision making.

2.2 The role of consumer behaviour in student decision making

Approaches to understanding consumer needs have been the focus of many academics' attention since the 1950s (Engel, Blackwell and Miniard, 1995; Evans, Moutinho and Van Raaij, 1996; Peter, Olsen and Grunert, 1999 and Peter and Olson, 2001). Blackwell, Miniard and Engel (2006, p. 4) suggest the process of identifying customer needs can be attributed to the development of the theory

of consumer behaviour, claiming consumer behaviour to be a broad field of study that investigates the*: "activities people undertake when obtaining, consuming and disposing of products and services"*, implying consumer behaviour to be the main theory which underpins the activities consumers follow when choosing to purchase a good or service.

These activities can be separated into three different categories; namely, obtaining, consuming and disposing. Evans, Jamal and Foxall (2009) argue that 'obtaining' is concerned with the processes leading up to consumption (e.g. the obtaining and evaluating of product information). In fact, Kardes *et al.* (2010) writing in their latest book *'Consumer Behaviour'* suggest that the majority of previous research focuses on this activity, because of the need to understand the way consumers process and digest product information. However this 'pre-purchase activity' approach to researching consumer behaviour fails to provide an insight into how consumers choose a product out of a set of alternatives. In fact, the growing pressure to understand how consumers choose products out of a set of alternatives is stimulating a growing interest on the 'consuming activity' (Peter and Olson, 2001).

In consumer behaviour, the 'consuming activity' is concerned with how the product is utilised as well as consumed (Mowen and Minor, 1998). Research into the consuming activity has become commonplace since the 1990s and provides knowledge about consumer choice (Moogan *et al.* 2001; Louviere *et al.* 2000). Indeed, Evans *et al.* (2009) acknowledge that the consuming activity provides detail concerning consumer choice which cannot be discovered from the 'purchase activity'. In contrast the 'disposal activity' concerns how consumers dispose of their goods and services after they have been consumed. Therefore, providing information on how products are, for example, recycled once the products have satisfied demand.

The main approach to investigating the three activities is through the consumer decision making process. Developed in the 1970s the consumer decision making process represents a “roadmap” that consumers follow when constructing decisions (Engel, Kollat and Blackwell, 1978, p. 81). Much of the research into the consumer decision making process has focused upon five core stages. These are problem recognition, search, alternative evaluation, choice and post-acquisition evaluation. It is worth noting that although a number of more recent contributions have reviewed the consumer decision making process (Evans, Jamal and Foxall, 2009; Blythe, 2010), very few recognise the importance of explaining the theory of consumer choice. Indeed, the terms purchase and choice are found to be used interchangeably within the consumer behaviour literature. Evidence of this is presented in Blackwell *et al.* 2006 and Kardes *et al.* 2010. The Oxford Dictionary definition claims choice as: *“an act of choosing between two or more possibilities”* (Oxford Dictionaries Online, 2010). In other words, in the context of the work presented here it is the comparison between two products. It is not a purchase. Purchase can be described as: *“acquire (something) by paying for it”* (Oxford Dictionaries Online, 2010), implying purchasing is concerned with a method of payment rather than a decision between two more alternatives. As a result Figure (2.3) draws up contributions from Mowen and Minor (2001) to represent the stages and activities involved in the consumer decision making process.

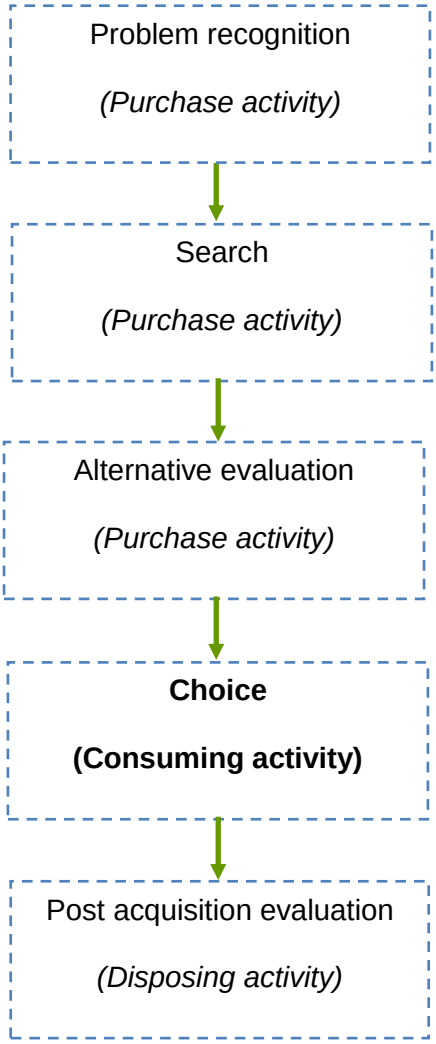


Figure 2.3: An overview of the consumer decision making process (adapted from Mowen and Minor, 2001, p. 172)

2.2.1 Problem recognition

Mowen and Minor (2001) state that there are five stages which are involved in the consumer decision making process. The first stage is problem recognition. The consumer decision making process begins when a consumer requires a need to be satisfied (Blackwell *et al.* 2006). A need is where there is a significant difference between what a consumer desires to be the given state (the situation the consumer wants to be in) and what is perceived to be the actual state (the consumer current situation) (Blythe, 2008). These expectations generally arise when a consumer's actual state falls below their desired state (e.g. a customer may feel thirsty and need a drink to satisfy their thirst). 'Needs' can be described

as a biogenic, such as thirst and hunger or psychogenic such as keeping warming (Chisnall, 1997; Blythe, 2010). Needs in consumer behaviour can be classed as psychogenic when needs are assumed as being **'affectional'** when individuals look to satisfy needs with others; **'ego-bolstering'** when individuals attempt to enhance their personality to achieve status to satisfy their ego and **'ego-defensive'** when individuals protect their personality to avoid physical or psychological harm (e.g. personal ridicule), implying consumers have a variety of different types of needs. The different levels of needs can be demonstrated diagrammatically using Maslow's 1954 hierarchy of needs (as found in Evans *et al.* 2009, p.12). Although a detailed account of these needs is not presented here, a review of the consumer behaviour literature suggests that individuals do not always move up the hierarchical ladder in the same way (Evans *et al.* 1996; Brassington and Pettitt, 2006) implying Maslow's theory only provides an outline of the needs that make up human decision making.

From a consumer behaviour perspective and considering universities, one major advantage associated with understanding student needs is that it allows universities the opportunity to identify new 'segments' of prospective students with unsatisfied desires. Identifying groups of students who have unfulfilled needs allows universities the opportunity to retain a higher number of prospective students if these needs can be satisfied. However, a recent study by Evans *et al.* (2009) warns that customer needs should never be totally satisfied, in order to provide scope for the business to grow. The writers do accept that, in reality, this can be difficult to achieve, although the identification of student needs would provide universities with the opportunity to develop courses that students demand. In other words, delivering degree courses that fulfil students' desired state would provide universities with the opportunity to develop a market advantage.

2.2.2 Search

Following problem recognition the next stage concerns consumers search for information. There are a number of ways this can be done. Information can be collected internally, with individuals drawing on past experiences or externally, through friends and family (Howard and Sheth, 1969). Chapman (1986) describes information collected from external sources as receiving information from 'knowledgeable others', claiming these sources provide an excellent opportunity to receive additional information in helping to satisfy the problem at hand. A detailed review of considerations involved in information processing is found in Evans *et al.* (1996), highlighting that consumers may expect better decisions after information acquisition, processing and retrieval from memory.

A further advantage of collecting information is that the pre-search process provides individuals with a greater opportunity of receiving higher rewards as decisions are based on sound reason and documentation. The search for information can also lead to individuals optimising brand choice and thus receiving greater levels of satisfaction (Blythe, 1997; Schiffman and Lazar Kanuk, 2008). Other benefits associated with the search for information suggest the retrieval of information increases an individual's level of efficiency. Finally, the ongoing search for information allows individuals to reduce the risk of cognitive strain and exposes consumers to a wider variety of up to date information.

Despite these favourable features there are a number of characteristics that can influence the search process. Kardes *et al.* (2010) outlines four criteria that determine how information is processed. These include consumer involvement, marketing environment, situational influences and individual influences. In terms of consumer involvement, a review of the consumer behaviour literature finds a theoretical divide between namely 'enduring' and 'situational' involvement. Kardes *et al.* (2010) describes enduring involvement as consumers' long-term interest in a brand. In contrast, Blythe (2010) suggests situational involvement

reflects a consumers' short-term interest with a brand, suggesting that differing levels of involvement exist.

The 'marketing environment' is the second criterion to influence consumer search behaviour, influencing every aspect of the search process. Kardes *et al.* (2010) claims product information can accelerate an individual's search through providing detailed information. However, one problem with the marketing environment is the cost of accessing information. Access to marketing information draws upon an individual's resources, particularly in terms of time and money. Brand chaos is another concern and suggests that a large number of choices leads to too much information resulting in cognitive strain which may have a negative effect on consumer search (Evans *et al.* 2009). The situational variable is the third criterion to influence the search for information. This criterion assumes time pressures and also an individual's ability to have an impact on the search for information (Solomon, 2009). The level of importance may also influence consumers' search process with higher risk purchases: for example, purchasing a house increases consumers' levels of perceived risk (a critique of the different levels of risk is provided by Solomon, 2009, p . 361-362). The final criterion is individual differences. This assumes gender and income differences can influence the way individuals search for information (Blythe, 2008); for example, Kardes *et al.* (2010) state how women find shopping 18% more relaxing than men. Therefore, suggesting that men may be less willing to take on new information when shopping than women in the hope of finishing more quickly.

For prospective students looking to go to university information is retrieved from internal and external sources (Stark and Marchese, 1978; Litten and Brodigan, 1982; Foskett, Maringe and Roberts, 2006; Kulchitsky, 2008). While it has been recognised that students draw upon past experiences (internal sources), a broad range of external sources can be found within the marketing literature. The most commonly cited include parents (Lewis and Morrison, 1975; Litten and Brodigan,

1982; Foskett and Hemsley-Brown, 2001) with a number of contributions suggesting mothers particularly to be a good source of information (Kandel and Lesser, 1969; Dahl, 1982 and Hearn, 1984); schools career advisors (Litten and Brodigan, 1982; Hayes, 1989; Hossler and Gallagher, 1987; James, Baldwin and McInnis, 1999; McClung and Werner, 2008); university representatives (Litten and Brodigan, 1982); teachers (Maringe, 2006; Foskett and Hemsley-Brown, 2001; Foskett *et al.* (2006) and friends (Hoyt and Brown, 1999), therefore suggesting prospective students to be information rich when making decisions about entering the university system. This range of external sources has led many studies to target students and stakeholders (as discussed in Section 2.1.1) involved in the decision making process (Bowers and Pugh, 1973; McClung and Werner, 2008), finding key differences in the types of information sources. In one of the first studies to investigate the type of media tools demanded by external sources, Litten and Brodigan (1982) found wide variation in the demand for product information. Similarly, this pattern is found in more recent studies (McClung and Werner, 2008) which highlight the need to target prospective students and stakeholders involved in the decision making process. Therefore stating, both parents and students to be actively open to receiving information about undergraduate courses. While the information search is not the focus of this thesis, parents, for example, seem to be increasingly concerned with admission requirements with students concerned about the financial cost, suggesting students to be more concerned with the cost of attending university (Bowers and Pugh, 1973 and Foskett *et al.* 2006).

2.2.3 Alternative evaluation

The next stage of the consumer decision making process is the evaluation of alternatives (also known as the evaluation of product attributes). In this stage, the different product alternatives that consumers admit to having information on are evaluated. During alternative evaluation, consumers trade-off the product

attributes that influence their choice of product (Louviere *et al.* 2000). It is important to note that attributes that are not favoured are rejected (Blackwell *et al.* 2006), identifying this stage only to concern the attributes that are considered important to the consumer. These alternatives are known as the consideration sets. Schiffman and Lazar Kanuk (2008) describe a consideration set to include the total number of alternatives available to the consumer that have been chosen using information collected from the previous stage. The information can be evaluated using either the categorisation or piecemeal process (Blythe, 2008). The categorisation process is preferred (Solomon, 2009) as it allows alternatives to be split into different categories (Solomon, 2009). Theoretical approaches involved in evaluating alternatives within the categorisation process include non-compensatory and compensatory decision strategies (Evan *et al.* 2009). Non-compensatory strategies are where the attributes that make up an alternative cannot be offset by the preference from another attribute within a choice set. The various approaches of non-compensatory strategies include '*conjunctive'* when consumers select a cut-off point for each attribute; '*disjunctive'* when consumers select a cut-off point for each level of attribute and alternatives are evaluated on their attributes and '*lexicographic'* when consumers rank the attributes in order of perceived importance, thus acknowledging a number of approaches to non-compensatory decision making.

However, Schiffman and Lazar Kanuk (2008) claim non-compensatory decision strategies to be more popular with uneducated consumers, suggesting 20% of American consumers to opt for non-compensatory decision strategies in order to reduce levels of cognitive strain. On the other hand advocates of compensatory strategies reject this approach (Foxall, 2007 and Evans *et al.* 2009), claiming the weakness of one attribute can be offset by the preference of other attributes that make up a choice set. Indeed, a number of studies in the marketing literature have compared the results of choice strategies using compensatory and non-

compensatory strategies reporting the majority of respondents to use a non-compensatory technique to evaluating alternatives (Foxall, 2005; Shocker, Ben-Akiva, Boccara and Nedungadi, 2006 and Schiffman and Lazer Kanuk, 2007).

There are clear advantages of understanding the strategies consumers use to evaluate different alternatives. The main benefit is that it allows marketing managers to identify the attributes that influence consumer choice. By supplying the attributes that fulfil customer needs, businesses can increase the chance of receiving customer loyalty (Mowen and Minor, 2001; Peter and Olson, 2001). Nevertheless Blackwell *et al.* (2006) argue research into how consumers evaluate alternatives is resource intensive, yet Blythe (2008) claims understanding how consumers evaluate products provides new opportunities to influence decision alternatives. Kardes *et al.* (2010) agree, suggesting businesses need to think strategically in order for consumers to consider their range of alternatives.

Attempts to understand the attributes that are important to students in the decision process would allow universities to target strategically prospective students. Attributes considered important near the time of the choice decision include course content (Chapman, 1986), location (Drewes and Michael, 2006) and reputation (Shocker *et al.* 1991; Moogan and Baron, 2003). However, Jackson (1982) argues the evaluation of alternatives is often influenced by a student's characteristics. As a result, Chapman's (1986) research showed that students evaluated attributes using internal and external information. Heap (2001) argues that open days provide an excellent opportunity for prospective students to evaluate the attributes that are included in their consideration set. One such study which was designed to investigate the way students evaluate alternatives was constructed by Moogan and Baron (2003). The findings from this study suggest that parents are having a significant influence on the attributes

students add into their consideration set, identifying a steady rise in parental involvement within the student decision making process.

2.2.4 Choice

Once the evaluation of product attributes has taken place, consumers must select one of the options from the two or more alternatives. This stage is known as choice. Choice is described as selecting one alternative from a set of possibilities (Solomon, 2009; Kardes *et al.* 2010). These possibilities are positioned within the consumers' consideration set. Techniques used to ensure a firm's product remains inside this set are found in Kardes *et al.* (2010) and include part-list cueing effect, attraction effect, trade-off contrast effect and compromise effect. Despite the evaluation of these various techniques not being the focus of this study, in this situation businesses try and use information to increase the probability that a consumer will choose their product. One major benefit of this approach is that consumers will continue to retain information about a particular product, thus reducing the chance of choosing an alternative product. Once the consumer's consideration set is defined, the differences between the different alternatives must be identified. Various information processing methods include stimulus-based, memory-based and mixed choice (Kardes, 2001). Kardes *et al.* (2010) describe stimulus-based choice as eliciting product information that is directly observable (e.g. product ingredients written on the side of a product). In contrast, memory-based choice is where consumers have no access to product information. However, one study published in the *Journal of Consumer Research* which compared the two approaches, revealed choices made from a consumer memory faded over time, increasing the need for observable information (Alba and Marmorstein, 1987). Therefore, the mixed choice method is preferred in order to reduce levels of product uncertainty.

The choice of a product is based on developing a product comparison. Comparisons can be based on a consumer's attitude or on the attributes that make up the product (Kardes, 1999). Information can be obtained for product comparisons using the "accessibility-diagnosticity model" (Kardes, 2001, p. 116). The accessibility-diagnosticity model assumes consumers rely on various elements of information to construct choices about different products. The way this information is recalled assists consumers in choosing between product alternatives. Kardes *et al.* (2010) argues that this provides a useful framework for understanding what information is likely to influence consumer choices. One of the most important features of this accessibility-diagnosticity model is that it provides an insight into what information consumers use when choosing a product; therefore, allowing businesses to develop more focused marketing strategies (Kardes *et al.* 2010).

Along with the accessibility-diagnosticity model, choice heuristics can split into attitude and attribute strategies. Mowen and Minor (2001) describe choice heuristics as a set of mental shortcuts that allow consumers to make decisions more easily. Therefore choice heuristics reduce levels of cognitive strain when developing a choice between two or more alternatives (Blythe, 2008). The most preferred method of choice heuristics in consumer behaviour research is attribute-based strategies (a more detailed explanation of the role of attributes within the mechanics of consumer theory is provided in Section 2.3 - Solomon, 2009). This can either involve 'between–alternative' processing where multiple products are compared one at a time or 'within-alternative' processing where many attributes are examined by one product at a time (Kardes *et al.* 2010). Examples of choice heuristics embedded within these processes are non-compensatory decision strategies, as discussed in the previous stage. The use of non-compensatory heuristic choice strategies suggests consumers select

attributes that on the whole score highly. Products that contain attributes that are of low value, are not chosen.

For universities understanding the reasons why students choose a particular university is central when trying to attract and retain prospective students (Maringe, 2006). Therefore, demand for understanding the individual attributes that influence student choice rather than the way information is processed is increasing. Today, research into student choice is positioned over two levels: university and course; (this is discussed further in Section 3.1). From these studies, it can be seen that there is growing pressure for universities to understand how to measure student choice rather than the way information is processed. Therefore suggesting a theoretical shift from explaining how students process information to the attributes that help them decide.

2.2.5 Post-acquisition

The final stage of the consumer decision making process is post-acquisition evaluation. Post acquisition is where consumers decide whether the product they have chosen has been a success or not (Schiffman and Lazar Kanuk, 2008). Success is often expressed through a customer's level of satisfaction. Blythe (2010) describes satisfaction as fulfilling customer expectation. One technique that consumers use to access their level of satisfaction is to compare their product with the alternatives they have rejected. This method is known as cognitive dissonance and allows consumers to identify any uncertainty associated with the product (Festinger, 1957; Mowen and Minor, 2001; Blythe, 2009; Blythe, 2010). Kardes *et al.* (2010) put forward a number of strategies to reduce post acquisition dissonance, including (1) increasing the perceived attractiveness of the chosen alternative; (2) decreasing the perceived level of attractiveness of the rejected alternatives and (3) increasing the apparent similarity between the final alternatives, implying the greater the number of rejected alternatives the greater the level of cognitive dissonance for a product.

The consumer behaviour literature identifies a number of ways to measure customer satisfaction. Indeed, Mowen and Minor (1998) suggest up to four different approaches. However, more recent contributions describe the disconfirmation paradigm to be the most popular method (Blackwell *et al.* 2006). With the disconfirmation paradigm, post purchase disconfirmation (feelings) is in line with prior expectations. Prior expectation can either be positive (i.e. better than expected) or negative (i.e. worse than expected), with positive expectation leading to greater levels of customer satisfaction. Details into the various levels of post-purchase disconfirmation are found in Blythe (2009), suggesting such outcomes could include e.g. delight where customers are increasingly likely to repurchase and dissatisfaction where customers are more likely to complain. Complaining can take a number of forms, for example formal complaints to suppliers, third-person complaints through solicitors and private complaints to friends and family (Evans *et al.* 2009). Blythe (2009) suggests formal complaints to be the most common method of complaining due to suppliers encouraging customers to share their feedback. Despite this, openness research into the tourist industry has discovered the existence of professional complainers who complain in the hope of receiving a reduction in the price of their holiday (Schiffman and Lazar Kanuk, 2008). This result Blythe (2010) finds difficult to understand as research has found that a fall in product quality is more important to the consumer than a loss of price, implying customers to be price insensitive.

One of the most important features of the post acquisition stage is that it provides a measure of customer satisfaction. Knowledge of the factors that increase levels of customer satisfaction can allow a business to grow. For many businesses this can be through increasing the likelihood of repeat purchasing (Blackwell *et al.* 2006). Blythe (2010) agrees, arguing that it is always cheaper to keep an existing customer than attract a new one. The post-acquisition stage also reduces the risk of negative experiences being communicated via word of mouth, reducing the

risk of affecting inward demand. However, despite these favourable features, the number of resources required to maintaining customer satisfaction is high (Kardes *et al.* 2010). More specifically there is a number of reasons why universities would consider this stage important. At present there is demographic dip in the number of school-leaver age students (Bekhradnia, 2007). This will make it increasingly more difficult in the future to retain prospective students. By measuring student satisfaction, universities can plan strategically for the future and fulfil their needs.

In conclusion, this section has attempted to outline the five stages of the consumer decision making process. As mentioned in Section 1.4 this study is interested in estimating student choice. Therefore, existing research on student choice for school leaver age applicants will provide useful insights that will allow this research to develop further. It is important to note that the influences on student choices for postgraduate and doctoral study are not presented here but can be found in Kallio (1995) and Stiber (2000) as the focus of this research is on school leaver undergraduate student choices. A more detailed discussion of student choice behaviour is provided in Section 3.1. Nevertheless, the underlying mechanics of consumer choice are discussed in the following section.

2.3 Discrete choice theory of consumer choice

In marketing the main approach to consumer choice is choice-based consumer theory (McFadden, 1986; Louviere *et al.* 2000). Two approaches to choice-based consumer theory include continuous and discrete choice. Chandukala, Kim, Otter, Rossi and Allenby (2007) argue choice to be continuous when the number of items purchased is greater than one (such as decisions that span more than one product category). However, the writers accept that choices that are continuous fail to provide an in depth insight into how consumers construct preference for complex products. Therefore the focus of this marketing study will develop a discrete approach to choice. Choice can be considered discrete when

consumers develop preferences for the purchase of a single item (Chandukala *et al.* 2007).

Discrete choice assumes preference can be measured through satisfying a set of axioms which for the purpose of this study provide a set of principles that school-leaver undergraduate students follow (Peter and Olson, 2001). First, it is assumed that individual decision makers are rational and develop decisions that maximise their chances of receiving the highest level of 'utility'. In an attempt to define utility a number of definitions are provided by the consumer choice literature. In fact Barbera, Hammond and Seidl (1998, p. 2) argue that even at the present time there is no agreement about the meaning of utility and how it should be defined. Early contributions by Jevons (1931) fail to distinguish the difference between 'utility' and 'preference'. It wasn't until nearly ten years later that Wold (1943) discovered that preference and utility do not to share the same theoretical assumptions, clearly showing that preference and utility are different. Furthermore, Debreu (1954) presents examples of preference relation which do not contain utility representation, confirming the difference between the two principles. This promoted a review into the meaning of utility by Friedman (1955), who critically describes utility to stand for different things to different people, implying theoretical inconsistency to surround the term. For the purpose of this doctoral thesis 'utility' is defined as the desirability of a good or service (Donaldson, 1999). This indicates that individuals choose an alternative that offers the greatest desirability. The other main assumption is that when individuals are presented with two or more bundles of goods, individuals can ascribe preference for one alternative over another, implying individual decision makers to have complete preferences. However, Amaya-Amaya, Gerard and Ryan (2008) argue that there are three extensions to the traditional theory of choice that are important when researching discrete choice approach.

First, the traditional view of consumer theory suggests individuals view goods as being homogenous (e.g. a degree course is a degree course) and further that utility is a function of quantities. However Lancaster (1966) rejects the assumption that goods are direct objects of utility. Instead Lancaster argues that the characteristics (or attributes) of a good represent the given utility (Lancaster, 1966) and that the properties of a good or service represent different levels of desirability. Previous studies had proved unsuccessful in expanding approaches to measuring utility, with Gorman, (1959) failing to accept properties of a good could be mutually exclusive. However, Lancaster (1966) disagrees, stating that all characteristics of an object to be recognised by all consumers, allow for utility to be measured through a single unit of measurement, a view that is still widely accepted today (evidence of this is found in Appendix A with some of the contributions from these papers being reviewed in Chapter 3). The second extension to the classic theory of consumer choice is that rather than individuals selecting an alternative within an infinitely divisible space, discrete choice theory assumes choice is made amongst a finite and mutually exclusive set of alternatives (Amaya-Amaya *et al.* 2008); therefore, implying further restrictions are placed upon individuals alongside budget constraints. Finally, where consumer theory assumes choice is completely deterministic in nature, discrete choice theory assumes consumer choice is probabilistic and therefore random. Indeed, Random Utility Theory was first developed in psychology by Thurstone (1927) before being introduced into marketing in the 1970s (Gensch and Recker, 1979). More recent contributions are attributed to a number of authors but driven by Nobel Prize winner Daniel McFadden. Details of these developments are published within the *Journal of Marketing Science* and *Marketing Letters* (McFadden, 1986; Ben-Akiva *et al.* 2002 and de Palma *et al.* 2008), demonstrating growing demand for the Random Utility Theory.

2.3.1 Random utility theory

The idea behind Random Utility Theory within discrete choice theory is that part of an individual's utility for an alternative is hidden (or latent). Therefore as shown in equation 1 Amaya-Amaya *et al.* (2008, p. 15) argue that the latent utility of alternative (*i*) in a choice set (C_n) (as perceived by individual (*n*)) can be separated into two parts. This includes a (**1**) systematic (observable) component specified as the attributes of the alternatives $V(X_{in}, \beta)$ and (**2**) a random (unobservable) component represented through ε_{in} measuring unmeasured variation in preferences.

(Eq. 1) $\mathbf{U_{in}=V(X_{in} + \beta) + \varepsilon_{in}}$

Therefore (X_{in}) represents the observable function that is made up of attributes that makes up the alternative (i) e.g. for a degree course and the characteristics contained within an individual (*n*) prospective student. The function (ε_{in}) remains unobservable. This can be further represented in equation 2:

(Eq. 2) $\mathbf{V_{in}= X_{in}\, \beta + Z_i \gamma}$

where (X_{in}) represents the bundle of components that makes up an alternative (i) (e.g. in this case a degree course). This could include e.g. 'location and price' as viewed by prospective student (n). This is further combined with the characteristics (z) of prospective student (n) such as characteristics including household income and parental occupation. Finally (β) and (γ) are the combined characteristics of coefficients that are to be measured (Lancsar and Louviere, 2008). Despite James *et al.* (1999) and Maringe's (2006) claims that measuring the importance of the attributes would put a university at a market advantage, a proportion of students' utility is hidden (Lancsar and Louviere, 2008). Indicators of utility are measured through prospective student choices (e.g. Option 1, 2 or 3). Prospective students ascribe utility to option (1) if the desirability for choosing a degree course is greater than the other (j) alternatives. Therefore assuming a

joint probability distribution for (εi) the probability (P) that maximum desirability is gained through choosing option (1) is recognised in (Eq. 3).

(Eq. 3) $\mathbf{P(Yi= 1) =P(U_{i1}>U_{in})}$

$$\mathbf{=P(V_{i1}+\varepsilon_{i1}>V_{in}+\varepsilon_{in})}$$

$$\mathbf{=P(V_{i1}-V_{in}>\varepsilon_{in}-\varepsilon_{i1})\ \forall j\neq 1}$$

Where (Yi) represents the unobservable component, choice models are derived by evaluating a distribution for the unobservable component (Lancsar and Louviere, 2008). However it is worth remembering at this point of the chapter that ($\varepsilon_{jn} - \varepsilon_{i1}$) as shown in equation 3 are unable to be measured as these components are unobservable, suggesting assumptions about choice outcomes can only be made up to the probability of occurrence (Ryan *et al.* 2008b). This demonstrates random utility theory to represent the probability that prospective students (n) choosing degree course (j) is equal to the probability difference between random utility of any other alternative (j). Meaning that the alternative degree course (j) is less than the difference between the random utility levels of alternative (j) and (j) for all (j) alternatives in the choice set. Random utility theory is frequently used to measure consumer preferences for publicly subsidised goods (these papers are reviewed in Section 3.4.2), further allowing policy-makers to measure the coefficients that most influence prospective students in their choice of course.

To summarise this section, discrete choice theory develops three extensions over traditional consumer theory. The main focus is that choice for a product is made up from the attributes of a good rather than the good per se. Consumers choose from a finite set of alternatives and that a proportion of consumer choice is latent and therefore random. The basic concept incorporated in random utility theory is the probability of occurrence. This can be reported as a fraction (0 to 1). The difference between the event occurring can be recognised the closer the elicit

value is equal to one. Therefore the probability of an individual (n) choosing alternative (j) over another alternative (*j*) from the choice set (C_n) is determined by the relative systematic attractiveness of (*i*) versus (*j*). The difference in Random Utility Theory is further represented when (V_{in}-V_{jn}) and ($\varepsilon_{jn} - \varepsilon_{in}$) as discussed in Eq. 3. This allows the difference in the distribution function to be discovered to determine the specific model form for the choice probability (Amaya-Amaya *et al.* 2008). This acknowledges discrete choice models to be developed to test independent estimation for a wide range of scenarios. Further detail on choosing probability models is discussed in Chapter 4.

2.4 Chapter summary

This chapter has shown how the theory of consumer behaviour can be used as a foundation to investigating student choice. Through the consumer decision making framework the different stages of the process have been explored. Yet this thesis focuses on the choices consumers make between two alternatives. This led to exploring the underlying mechanics of consumer choice known as discrete choice theory. The way choice can be estimated was presented and has demonstrated the importance of random utility theory identifying choice behaviour to be a probabilistic phenomenon. In the next chapter the application of discrete choice theory and its relationship to consumer reservation price are presented.

Chapter Three

Student choice and student reservation price

3.0 Introduction

The specific objectives of this chapter are to critically review the student choice literature to explore the attributes that influence student choice and examine whether the development of discrete choice modelling would provide a theoretical alternative approach to using rating scales when estimating course level decision making. This is followed by a critical review of the literature on estimating consumer reservation price and from that review put forward an alternative approach to estimating student reservation price for the attributes that make up a degree course. The chapter finishes by outlining the guiding principles to designing a discrete choice experiment.

3.1 Student choice behaviour

The section discusses the existing literature on student choice to provide a context for introducing student reservation price.

The number of studies that have investigated student choice in marketing has increased over the last 30 years (Chapman, 1986; Roberts and Higgins, 1992; Coccari and Javalgi 1995; Roberts and Allen, 1997; Foskett and Hemsley-Brown, 2001; Dawes and Brown, 2005; Hagel and Shaw, 2010). Many of the studies which have been conducted to date have investigated university level choices (Moogan *et al.* 2001; Soutar and Turner, 2002; Price, Matzdorf, Smith and Agahi, 2003). To date much university level choice research (Dawes and Brown, 2002; Teranishi, Ceja, Antonio, Allen and McDonough 2004; Holdsworth and Nind, 2005; and Dawes and Brown, 2005; Kim, DesJardins and McCall, 2009) has been based on Hossler and Gallagher's (1987) three phase model (as shown in Figure 3.1).

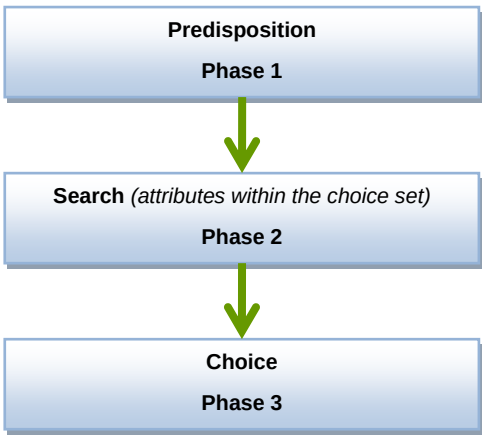


Figure 3.1: A three phase model for university student choice (Hossler and Gallagher, 1987, p. 208)

Salisbury, Umbach, Paulsen and Pascarella (2009) describe how the model provides a solid foundation when researching university level decision making behaviour. The model begins by investigating students' 'predisposition' towards attending university. The predisposition phase can be described as discovering whether prospective students are interested in going to university. As discussed in Section 2.2.2 students are influenced by a variety of stakeholders in the early stages of deciding to attend university (this is further discussed in Section 4.2.1). Indeed Hossler and Gallagher (1987) acknolwedge the influence external stakeholders have on selecting the core attributes (as previously discussed in Section 2.2.4) within the search phase. The 'search' phase involves prospective students with assistance from stakeholders evaluating the attributes they consider important when choosing a prospective university. During the search phase students short list a possible number of attributes to be contained within a choice set. Kotler (1997) describes a choice set as containing a finite number of the attributes that students consider most important when choosing a prospective institution. The process concludes with students constructing choices based on the attributes contained within the choice sets.

Nevertheless, according to Maringe (2006) only very limited research has been used to attempt to understand choice behaviour for undergraduate degrees. Indeed, he goes on to state that the attributes that influence student choices (as shown in Phase 3) at course level has received the least amount of attention within the existing body of literature. However, McClung and Werner (2008) suggest that understanding the attributes that influence choice of degree course is essential with the uncertainty surrounding university funding.

Other reasons for investigating course level choices are more concerned with the types of institutions. The number of institutions allowed to award degrees is increasing; Brown *et al.* (2009) argue that students are becoming increasingly consumerised. This increase in the level of choice is generating interest from a wide variety of people; namely, researchers, universities, universities admission tutors and senior policy makers (Brown *et al.* 2009), suggesting that universities need to be increasingly aware of the factors that influence choice of course (Coccari and Javalgi, 1995; Maringe, 2006). As a result, this is putting increasing pressure on universities to develop approaches that can predict student choice. Other issues relate directly to the student population (Soutar and Turner, 2002; Ackerman and Gross, 2006). As described in Section 1.1 the number of prospective students at school- leaver age is decreasing (Briggs and Wilson, 2007). Demand for universities to focus more on new markets is, in turn, increasing. Therefore, universities need to understand how students construct their choices. Not surprisingly, many of the existing studies argue that for universities to survive it is essential to understand the factors that influence student choices (Whitehead, Raffan and Deaney, 2006 and Hagel and Shaw, 2010).

In marketing, traditional means of investigating course level choices have evaluated the attributes students consider most important when constructing their choices (as recognised in phase 3 of Hossler and Gallagher's 1987 model). Yet,

Young (2003) describes how early approaches to understanding course level choices have mainly been concerned with ordering the attributes, rather than predicting the attributes that influence student behaviour. Briggs (2006) argues that whilst such studies are concerned with linking historical data, more research is needed to be able to predict student choices in order to develop precise marketing campaigns. In the following section the approach taken by the existing research on course level choices will be reviewed. This will allow a gap within the existing literature to be identified which this research will contribute towards filling.

3.1.1 Choice behaviour for course level decision making

The first study to investigate the attributes that influence choice of course was developed in Australia. The study designed by James *et al.* (1999) was interested in understanding the attributes that influence potential applicants' choice of course. The main reason behind the study was outlined in the West Review (Australia. Department of Employment, Education, Training and Youth Affairs, 1998) in 1998 suggesting that funding in Australia would be more directly linked to student choices as it would bring several benefits to the sector such as encouraging students to choose more carefully. A random sample of 1475 students was taken from year 13 students, asking them to rank attributes using a 5 point rating scale. This then provides a way of rating the attributes to indicate the strength of preference associated with them. The results from the study were that students' confidence in their ability to meet the demands of the course was ranked the most important factor when choosing a course. Reputation of the course amongst potential employers was also considered as influencing student choice. By choosing a course that has a positive reputation amongst employers is considered highly amongst prospective students in Australia. The same study also acknowledged quality of teaching as having an influence on choice of course. Approaches to learning, including the structure of the syllabus had a

significant impact on student choice, thus demonstrating that prospective students regard the level of teaching to be an important decision making factor. Foskett and Hemsley-Brown (2001) agree, acknowledging quality of teaching to have an impact on student choice of course although ambiguity can surround the measures of quality of teaching. This suggests that prospective students could relate to the concept through a number of different ways.

In an attempt to clarify quality of teaching and understand how it is measured, a report published by Sastry and Bekhradnia (2007) for 'The Higher Education Policy Institute' (HEPI) investigated the amount of contact time English students receive as part of their undergraduate studies as part of a proxy to quantifying quality. The findings highlight that on average, students receive around 14 hours of teaching contact time per week. Nevertheless, the authors claim the amount of contact time differs greatly per subject; for example, medicine and dentistry degrees (22 hours per week) have on average 12 more hours of teaching per week than degrees in humanities and social science (8 hours per week). However, Patton (2011) argues that students studying in English universities are receiving less contact time than students studying undergraduate courses in European universities. In fact, in an article published in the Daily Telegraph, Paton (2009d and 2011e) argues that large class sizes and reduced contact time to be causes of poor quality of teaching and that prospective students consider the number of contact hours to be a factor that influences their choice of degree course.

From the Australian study, a second project was developed to investigate the attributes English students consider important for course level choices. Developed in Southampton, Maringe (2006) secured 387 observations from a survey instrument containing 35 attributes. Each respondent was asked to rank each attribute 1-10 on a rating scale in order to examine the extent they considered those attributes as being important in their choice of course. The

findings from the study revealed graduate employment to have the strongest impact on student choice. Thus, potential future job opportunities have a strong influence on choice.

In a broader manner Maringe (2006) also explored the attributes which prospective students consider important at a university level. At this level the most important attribute was the type of course, identifying the length of the course to have a strong influence on student choice. As found in his first survey, graduate employment was ranked highly, with students also highlighting the importance of part-time work to influence their choice of institution. Furthermore, the academic reputation of the university was also considered as influencing students' choice of university, more specifically position in the university league tables and type of institution (pre 1992 and post 1992) were considered to be influential. In fact, he claims: *"course of study decisions tend to be closely related to institutional choice decisions"* (Maringe, 2006, p. 470) implying similarities exist between the two decision making levels. By reviewing the attributes at a course level it is clear this is an area that has received very little academic attention. Therefore the remainder of this section provides a brief account of the attributes that are identified as influencing choice at a university level.

3.1.2 Choice behaviour for university level decision making

Decision making at a university level is also based on the product attributes that influence student choice. Again this section specifically looks at the attributes that influence school- leaver age applicants. One attribute considered important at a university level is 'facilities'. Fleming and Storr (1999) first identified the facilities which could have a significant influence on student choice by enhancing the student learning environment. Since the late 1990s knowledge that facilities are a means of attracting prospective students at a university level has continued to increase. Price *et al.* (2003) discovered availability of computers and library facilities to influence student choices. Other significant factors include the quality

of university owned accommodation. Further examination identified quality to include access to en suite facilities, I.T, internet access and cleanliness were major factors that influenced student choices (Maringe, Foskett and Roberts, 2009). The price of the accommodation was also acknowledged to be a significant influence (Maringe, 2006; Price *et al.* 2003). A study by the UK largest provider of student accommodation UNITE, confirms these findings and shows that demand for university-owned accommodation has increased 2% since the rise in tuition fees in 2006, thus reflecting a steady demand for university rented accommodation (UNITE, 2007). Yet demand for privately owned premises had seen a 6% decrease since the introduction of top up fees between 2005-2007, implying students ascribe greater preference to university owned accommodation since the cost of attending university has risen. In fact, UNITE (2007) puts this down to the rising cost of utility bills that are covered in the price of university accommodation.

Another attribute to influence student choice is the location within the country. The location of a degree course is considered a major influence on student preference (Hooley and Lynch, 1981; Wright and Kriewal, 1980; Welki and Navratil, 1987; Bayne, 2001; Moogan *et al.* 2001; Souter and Turner, 2002; Price *et al.* 2003; Moogan *et al.* 1999; Drewes and Michael, 2006; Foskett *et al.* 2006). The location of the course within the country is frequently ranked as one of the most important attributes when choosing a university (Moogan *et al.* 1999; Moogan *et al.* 2001; Price *et al.* 2003). This would seem to indicate that prospective students consider the distance from their family home to be an important factor, when choosing an undergraduate degree course.

More recently a study targeting one thousand prospective students found that 36% of respondents would choose a university that was close to home (Greenhalgh, 2009) enabling students to utilise already established links to the labour market while reducing the threat of paying for rented accommodation

(Foskett *et al.* 2006; National Union of Students, 2009; Davis, 2001). This study would suggest that the price of accommodation has a growing impact on student choices. From 2009, the British Government's decision to freeze student grants and loans is predicted to impact further on students' decisions when considering the location of an institution (Paton, 2009a).

Another attribute that has gained attention due to the uncertain financial conditions is 'safety'. Despite safety being more commonly cited within international student choice research (Lawley, 1998; Shanka, Quintal and Taylor, 2005), there is growing interest amongst university level choices. Safety can be described as safety of the university campus (Abubakar, Shanka, Nkombo Muuka, 2010), acknowledging prospective students consider the safety of the university facilities to be an important factor when choosing an undergraduate degree course.

The price of attending university is another attribute that influences student choice. Despite the recent increase in the price of fees, Hossler and Hu (2000) suggest that there is little evidence to suggest that price is a factor in the student decision making process. Yet, Christie, Munro and Rettig (2001) argue that the cost of university is often under-estimated by prospective students, suggesting students give little consideration to the price of admission into university. However the introduction of top up fees in October 2006 witnessed much criticism and confusion surrounding the attribute 'price'. Maringe *et al.* (2009) discovered no evidence to suggest that the increase in the price of tuition fees would deter student choice and that students identify the benefits of university entry to outweigh the cost of HE. However, today the cost of attending university is becoming more of a factor. Swaine (2009) along with Paton (2009a; 2009b; 2009d) suggest that prospective students are becoming increasingly more price-sensitive in their decision to attend university. In other words the price of fees is becoming more of a factor to prospective students when choosing an

undergraduate degree course. However, despite this increase in attention for the attribute price no previous study has examined how much students will pay to attend university, highlighting a gap within the existing literature.

The final attribute to affect university level choice is entry requirements. Entry requirements concern the number of UCAS points needed to secure a place on a course. The UCAS point system can be described as the process for assigning points to the qualifications needed to gain entry into HE (www.UCAS.com accessed 3rd March 2011). Brown *et al.* (2009) found the number of points impacted on students' decision for university level choices, suggesting the number of points to be linked to a university's reputation. Although entry requirements are found to influence choice, little is known within the current literature about the number of points that influence student choice. The attributes cited as being important are represented in alphabetical order in Figure 3.2 (over the page). This shows 9 attributes to have an influence on student choice of course.

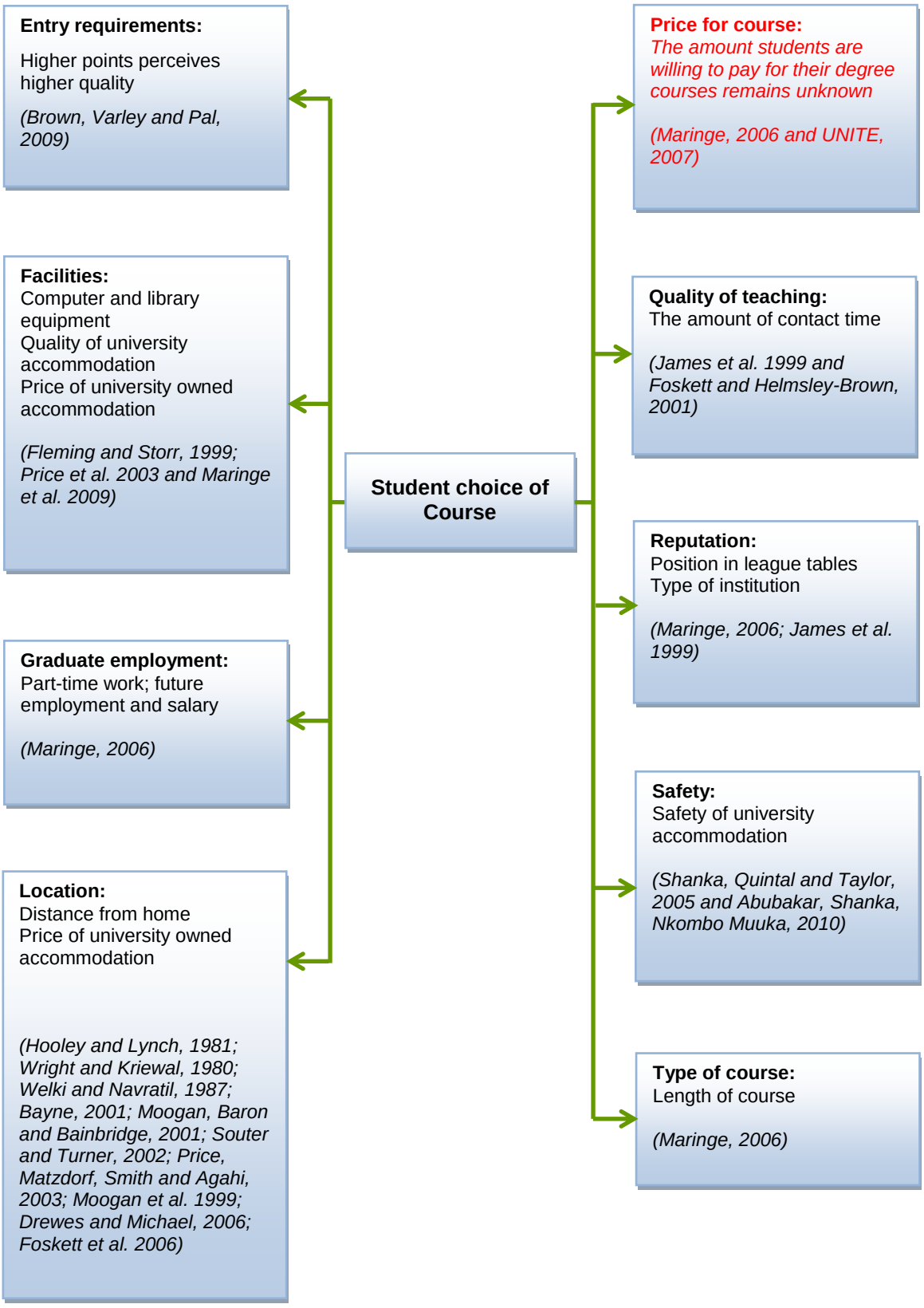


Figure 3.2: An outline of the attributes and themes influencing students' choice of course (in alphabetical order)

3.1.3 Criticisms of the approach taken by course level research in analysing the student choice

Although the two studies (James *et al.* 1999 and Maringe, 2006) to date have provided an indicator of the attributes students consider important when choosing a degree course there are a number of problems with their approach. This section discusses the limitations of using rating scales as a means of estimating student choice and how these problems may be addressed.

One of the most commonly cited problems with using rating scales is related to the overall design (Louviere and Meyer, 1976). In one of the first thorough reviews into the application of rating scales in marketing, Friedman and Amoo (1999) claim that there are many ways that rating scales can provide biased results. More commonly cited problems include labelling (Friedman and Leefer, 1981; Schrauf and Navarro, 2005 and Dillman, 2008), language (Myers and Warner, 1968; Hodge and Gillespie, 2003 and Burns and Bush, 2010), the type of contextual information used (Batsell and Louviere, 1991 and Malhotra, 2004) and the number of points (Churchill and Peter, 1984; Dillman, 2000 and Dillman 2008). One of the most commonly raised problem by prominent choice authors such as Daniel McFadden and Jordan Louviere, is how rating scales are unbalanced. In fact, Lockshin, Mueller, Louviere, Hackman and Gillispie (2007) argue that most applications of rating scales end up with most items being classed as ‘relatively important’, thus making it difficult to discriminate between the various items included in the scale. Furthermore, Lockshin, Cohen and Goodman (2009) go on to state that what one person may consider to be 7 out of 7 may be rated 5 out of 7 by another person, further highlighting inconsistency in the way people use rating scales.

It is also worth noting that rating scales are not free from cultural influences (Lockshin *et al.* 2007). The numbers contained within rating scales can be viewed differently amongst various cultures. In more polite cultures such as Asia where James *et al.* (1999) conducted the first study into the attributes that influence course level decision making, Lockshin *et al.* (2007, p. 32) describes how: *"many people refrain from using the lower ends of the scales"* and this suggests that asking students to rate attributes can lead to potential biases in the choice process. The association between product attributes and their levels (values) is also often regarded as a weakness of rating scales (Flynn, Louviere, Peters and Coast, 2007 and Lockshin *et al.* 2009). Rating scales are unable to distinguish between the different levels connected with an attribute, further restricting the values of an attribute to be identified. In addition to this, restricting the values connected with different attributes prohibits student respondents to develop trade-offs between the required levels of the attributes such as price or number of entry requirements.

However the main criticism with rating scales is their association with satisfying mathematical assumptions rather than behaviour theory. First, developed in 1930s, rating scales are the most widely used method of measuring consumer 'attitude' towards the attributes that make up a product (Zanna and Rempel, 1988; Friedman and Amoo, 1999; Mowen and Minor, 2001; Kardes, 1999 and Kardes *et al.* 2010). The popularity of using rating scales can be attributed to a number of factors including ease of construction and ease of analysis through ordinary linear regression (Hodge and Gillespie, 2003). However, the assumption that rating scales can also be used as a substitute to estimate the attributes that influence consumers' 'choice' is incorrect. Writing in the 'Journal of Marketing Research', seminal authors Louviere and Woodworth (1983) claim that there is no formal theory relating rating scales to consumer choices. According to Elrod, Louviere and Davey (1992, p. 368): *"choice is usually the behaviour of ultimate*

interest, and the models estimated from choice data presumably have an advantage in predicting choice behaviour". Indeed, Louviere *et al.* (2000, p. 25) describe: *"generally speaking there can be no valid measurement without an underlying theory of behaviour of the numbers which result from measurement... Specifically, if a survey enquires 'How satisfactory was the wait in the queue to be served at the counter?', and consumers can respond on a scale from 0 (=extremely unsatisfactory) to (say) 10 (= extremely satisfactory), what does a '6' mean?"*. These studies would suggest that it is impossible to estimate student choice behaviour using rating scales as the items included in the instrument have no formal connection with the students' decision making process.

Surprisingly there has been relatively little guidance in the marketing literature on how to confront this problem. However since the 1980s contributions from researchers outside the marketing literature (McFadden, 1986; Louviere, 1988) have built upon earlier arguments in order to construct a theoretically underpinned approach to estimating the attributes that influence consumer choice.

McFadden (2001) along with Young (2003) suggest the problems with rating scales can be overcome using choice techniques that are theoretically supported by rational behavioural theory. Indeed, this view is supported by Briggs (2006). In 2006 an exploratory study was conducted in Scotland to consider whether there were any alternative theoretical-grounded approaches to investigating student behaviour rather than rating the attributes. In describing the purpose of the study, Briggs (2006, p. 706) states: "*this work hopes to use discrete choice modelling, which is concerned with identifying future behaviour (McFadden and Train, 2000), to develop a predictor of undergraduate institutional choice"*. The findings from the study go on to report that being able to incorporate discrete choice theory and models into student choice research would provide insight and:

"The ability to predict the impact of these and other factors on student choice would be potentially invaluable to an institution. Even if a model that 'predicts' student choice decisions is not feasible, the development of a conceptual model of consumer choice would not only provide a representation of relationships 'between' factors (attributes), but would also facilitate comprehensive analysis and therefore have intrinsic value."

(Briggs, 2006, p. 719)

3.1.4 The gap within the student choice literature - the way forward

The studies presented in Section 3.1.1 and 3.1.2 illustrate that it is possible to rank the attributes that influence student choice at a university and course level. For course level research, only two specific studies have examined the attributes that influence student choice. From a geographical point of view only one of these studies was developed in England and this suggests that this is an area that is seriously under researched. One attribute that is receiving growing attention is price. This is primarily due to the uncertainty surrounding the funding of the university sector. However, little is known about predicting how much prospective students will pay for their degree course and how different prices may influence course level choice, although Breidert (2006) describes that estimating how much consumers are willing to pay for a product or service is often extremely complex (a review of this paper and others on the various theoretical approaches to estimating consumer reservation price are reviewed in Section 3.3).

From a theoretical point of view, using a rating scale to research choice behaviour is clearly inadequate. There is no theory linking choice behaviour with these techniques (Louviere and Woodworth, 1983; McFadden, 1986; McFadden, 2001 and Briggs, 2006); therefore, any results using these approaches are simply ad hoc. Hence the results taken from James *et al.* (1999) and Maringe (2006) studies into course level choice are very likely to be unreliable.

These differences in estimating the attributes that influence student choice using the theory of consumer behaviour suggest that there is scope for further work in this area. As Briggs (2006, p. 706) has suggested: *"whilst such models are concerned to link patterns in historical data, they do not predict choices for new offers or new marketing strategies".* Therefore the way forward may be to investigate discrete choice theory and models (as discussed in Section 2.3 and based on Lancaster's 1966 theory of choice) as an alternative theoretical approach is essential in developing a predictor for undergraduate choices (Briggs, 2006). In light of this support the following section discusses the role of consumer theory and the attributes when estimating consumer reservation price.

3.2 Consumer reservation price versus willingness-to-pay

Despite the concept being developed over 20 years ago, marketing academics have failed to agree on a definition for consumer reservation price. Indeed, Jedidi and Zhang (2002) have observed that the term willingness-to-pay and consumer reservation price are used interchangeably within the consumer choice literature. Yet, closer inspection reveals the term willingness-to-pay is used extensively within the health and environmental normative micro economic literature to represent welfare (Amaya-Amaya, Gerard and Ryan, 2008). In normative micro economics welfare theory traditionally provides the foundation to guide the allocation of society wide resources (Little, 1957; Pigou, 1962; Johansson, 1997 and Ryan and San Miguel, 2000). Welfare theory investigates the methods of obtaining a social ordering over alternative possible states of the world, in which different states are ranked in terms of benefit based upon being '*better than*, *worse than* or *equally as good* as every other (Boadway and Bruce, 1984). The need to understand how welfare is proportioned to each policy would provide greater understanding on how members of society assign utility. McKenzie (1983) argues that utility can be observed by incorporating a money metric scale or equivalent income function. In fact, a review of the economic literature identifies

two approaches to measuring observable welfare. These include compensation variation and equivalent variation, suggesting the concept of willingness-to-pay appears to emerge from cost benefit analysis frameworks, using money as a measure of consumer preference and economic efficiency (Bateman, *et al.* 2002). Therefore the term is not willingness-to-pay. As this study examines consumer behaviour based in the marketing literature, the discipline domain, the term consumer reservation price is the more appropriate.

One of the earliest definitions of consumer reservation price is presented by Hauser and Urban (1986). In their paper they describe consumer reservation price as: "*the consumer was asked to specify the minimum price of which he/she or they would no longer purchase the durable"* (Hauser and Urban, 1986, p. 449). Some writers, however, have acknowledged consumer reservation price to be determined by a consumer's level of utility. For example, Kohli and Mahajan (1991) described consumer reservation price to be: "*determined by his or her (estimated) utility for the product in relation to the price and utility for his or her most preferred product"*, Indeed, Jedidi and Zhang (2002, p. 1352) go on to state that: *"a consumer's reservation price for specific product is simply the price at which the consumer is indifferent between buying and not buying the product, given the consumption alternatives available to the consumer"*. This suggests that a change in the price of an alternative can be represented in terms of a change in a consumer's utility.

From the above examples, it is clear that the definitions of consumer reservation price have remained fairly constant over the last 24 years. However, more recent definitions have continued to acknowledge the role of utility. Jedidi and Jagpal (2009) argue that it is this understanding of a customer's utility that is crucial for businesses to discover their customers' reservation price and allow the business to grow. Therefore, for the purpose of this study, consumer reservation price is represented as a monetary figure for the utility associated with the attributes that

make up an undergraduate degree course and it is this view that will underpin this study.

3.2.1 Estimation of consumer reservation price

There are three factors that have encouraged marketing academics to research into consumer reservation prices. This interest can be attributed to scanner data where the availability of transaction data is readily available and e-commerce which has encouraged customer personalisation and methodological advances in areas such as experimental design that have allowed more accurate estimates to be developed (Jedidi, Jagpal and Manchanda, 2003; Jedidi and Jagpal, 2009). The main reason why estimating consumer reservation price is favoured by many marketing academics is that it is theoretically located within the theory of consumer behaviour. According to Jedidi and Zhang (2002) historically, approaches to understanding the price consumers will pay for a good or service are more commonly based on guesswork. Indeed, Xia, Monroe and Cox (2004) agree, claiming only 8% to 15% of all businesses develop pricing strategies based on behavioural theory thus, showing there is a clear need for future contributions in marketing to position their studies in the theory of consumer choice. At a broader level, understanding why consumers are willing to pay for a product allows a business to fulfil customer expectation and increases the chances of securing customer loyalty (Sichtmann and Stingel, 2007). Other advantages of knowing a consumer's reservation price can be considered more managerial. One main feature associated with consumer reservation price is that it can be extremely useful when forecasting market responses for new products (Breidert, 2006). Knowledge of how much consumers are willing to pay for a business's products is vital in predicting demand and revising pricing policies (Wertenbroch and Skiera, 2002). One such study from the marketing field that investigated customers' reservation price for personal computers revealed knowledge of their prices would allow, in this case, a computer manufacturer the

opportunity to increase market share (Jedidi and Zhang, 2002). Findings from this research show consumers will pay an additional $600 for an improvement in processing speed when choosing a desk top computer, allowing senior managers in the organisation the opportunity to decide whether it is more profitable to increase the processing speed of their computers or to, in turn, reduce the price of their products. Despite these advantages, consumer reservation price research has a number of problems. Today there remains only a small number of contributions in the marketing literature. In fact, although research into consumer reservation price developed in the 1980s there remains only over 30 published studies whilst a significant amount has been published in neighbouring disciplines such as economics and anthropology. One other observation which can be made from a recent review of the consumer reservation price literature is that most papers contribute to the methodological development of the technique (Kohli and Mahajan, 1991 and Wang, Venkatesh and Chatterjee, 2007), showing there is a clear need for more research in the application of the technique. It is for this reason that there are today only limited examples of applying consumer reservation price research in the marketing area.

One sector that would benefit from further research into the application of reservation price research is HE. Universities' marketing managers have continued to draw upon marketing theory in an attempt to better understand student needs (Maringe and Gibbs, 2009). Nevertheless, it is now recognised that in a world of government spending cuts (as discussed in Chapter 1), there is an even greater need for universities to make informed choices about how best to market their degree products. Over the past 12 years, the British Government has been involved in two main policy activities in order to charge students for admission onto undergraduate degree courses. The first Government reform was launched in October 1998, seeing the introduction of upfront fees for all undergraduate degree courses. Critical appraisal of these reforms, have been

undertaken by Barr and Crawford (2004). The second reform is the introduction of top-up fees from the passing of the Higher Education Act 2004. The aim of the reform was to allow universities to increase the price of their tuition fees in order to charge students a maximum price of £3,225 per year. The establishment of higher fees allowed many universities to increase inward investment further reducing reliance on public sector funding. As discussed in Section 1.1 a new review into the pricing of undergraduate degrees has just been conducted. In October 2010, Lord Browne recommended that English universities should have the freedom to decide the price of their courses in a direct attempt to increase sector wide investment, thus, increasing the need for English universities to understand what is prospective students' reservation price for their undergraduate degrees. However, there is little evidence of such theoretical techniques having been developed and applied within the previous marketing research or, in fact, HE. In the following section of this chapter the current approaches used to estimate consumer reservation price found within the marketing and broader research literature are introduced.

3.3 Current theoretical approaches used to estimate students' reservation price

Over the past few years, there has been increasing interest in how much universities would charge if the fee cap was removed. A review of the marketing and education literature identifies an increase in the amount of research investigating the effects a change in tuition fee pricing would have on undergraduate students (Foskett *et al.* 2006 and Maringe *et al.* 2009). Despite this rise, only a small number of theoretical approaches have been developed to predict students' reservation price. One possible way for an English university to make such a decision is to compare the cost of attending their degree courses against other institutions. In 2008, an unpublished report comparing tuition fee pricing between UK and American universities suggests institutions develop

benchmarks comparisons (Gabriele, Groves, Slee and Watts, 2008). Within this approach universities can monitor and compare the cost of their price against rival universities. Despite this approach being popular, it assumes all university courses are similar, making it difficult to differentiate between similar degree programmes. Moreover values generated through this approach have little basis in marketing theory and are not recognised as a formal approach to eliciting student reservation price. Alternatively, the price of tuition can be estimated from measuring the price elasticity of the market (Turner, Baba and Shimada, 2000). This reports any changes in the demand for degree courses between, for example, the price of tuition fees with the level of prestige associated with the institution. Nevertheless, research based on price elasticity provides little knowledge in understanding the attributes that influence student choice. Furthermore, research based on price elasticity of demand is more commonly associated with micro economic theory which is outside the scope of this study

Another approach to identifying students' reservation price is based upon direct data. Student reservation price can be estimated from either direct or indirect data (Breidert, Hahsler and Reutterer, 2006). Direct data (also known as revealed preference data) estimates reservation price using actual market data. Types of direct data include scanner and simulated test market data and benefit from high levels of external validity (Wertenbroch and Skiera, 2002). One rare example of such a study that estimated student reservation price for full-time undergraduate degrees in England using direct data was developed by OpinionPanel Research in London (OpinionPanel, 2010). In February 2010, the group published a study reporting students' reservation price using a version of the direct approach technique known as the van Westendorp price sensitivity meter. Introduced in the 1970s, the van Westendorp price sensitively meter targets existing customers to produce a range showing the lowest and highest prices students would be willing to pay to attend university (Morris and Morris, 1990). Breidert (2006) describes

how this involves asking respondents a series of four questions to discover a price bracket that respondents are willing to pay. In analysing students reservation price decisions, OpinionPanel (2010) discovered that the differences in what students were willing to pay in an unrestricted market were vast, identifying a broad reaction to price. OpinionPanel (2010) found that as much as 80% of students rejected a place at university when the price of tuition reached £10,000 per year, suggesting price to have an overwhelming influence on students' decision to attend university. However at £5,000 more than 50% of students claimed they would still attend university, despite the increase in fees. Other findings from the study revealed there was substantial demand for university education up to £7,000 per year, even though there were reports of significant differences in students' personal demographics emerging as the price of tuition increases.

However, in spite of these favourable features, there is a number of problems which have been associated with the van Westendorp price sensitivity meter. One major criticism of the van Westendorp price is its unnatural focus on price. By directly asking students how much they would be willing to pay can increase levels of cognitive strain (Bateman *et al.* 2002). According to Breidert (2006) this can force students to provide an inaccurate reservation price. One solution would be to ask students to choose between two or more course alternatives at different prices and see which course they prefer. By removing the emphasis from price would directly reduce the threat of respondents receiving high levels of cognitive strain (Wierenga, 2008).

The van Westendorp price sensitivity meter also provides individuals with little incentive to reveal their true reservation price. For example in a study in America, Nessim and Dodge (1995) found customers were more likely to give artificially lower prices in an attempt to keep prices low. There are also problems with the approach taken by the van Westendorp price sensitivity meter to elicit consumer

choices. Estimating consumer reservation price using the van Westendorp price sensitivity meter does not necessarily mean these values would reflect real choice decisions (Nessim and Dodge, 1995). Reservation price estimates using this approach can also be affected by high levels of social pressure causing students to overestimate their reservation price (Sichtmann and Stingel, 2007). This would suggest that many values estimated using the van Westendorp price sensitivity meter may be overestimates of students' true reservation price. Wertenbroch and Skiera (2002) believe this problem can be overcome using an alternative direct approach known as Vickery Auctions. By telling students that they must buy the good in a real transaction if their bid wins, provides an incentive for respondents to reveal their reservation prices truthfully (Breidert, 2006). However Voelckner (2006) admits this approach becomes increasingly difficult to achieve for one-off high price goods such as a degree course.

Finally, there is little evidence to show that the van Westendorp price sensitivity meter estimates price based upon students utility. With each respondent price is estimated based on the maximum and minimum price they are willing to pay to receive the product. This disregards more recent contributions found within the marketing literature (Kohli and Mahajan, 1991 and Jedidi and Zhang, 2002). In fact, the confusion continues as the van Westendorp price sensitivity meter approach also fails to reveal monetary estimates for the individual attributes that makes up an alternative. A view that clearly ignores Lancaster's (1966) contributions to the theory of consumer choice.

In terms of the HE sector the main criticism of the OpinionPanel's measure of reservation price is its association with current students. Despite the study benefiting from a high sample size (37,000 respondents) the study ignored the need to target prospective students, despite having access to over 24,000 prospective students through their online data base. This failure to target prospective students provides little understanding of how changes in fee pricing

would affect future students. Holdsworth and Nind (2005) agree, acknowledging current students suffer from post rationalisation and this suggests that reservation price estimates may be distorted by positive and negative experiences.

Since current studies determining students reservation price can be recognised as having a number of problems, it seems appropriate to look at indirect approaches of estimating students' reservation price. In the following section the theoretical basis of indirect approaches is discussed, thus providing a theoretical link between university products and their associated monetary value.

3.4 Indirect approaches of estimating consumer reservation price

Indirect approaches of consumer reservation price can be described as generating monetary values through measuring utility for customers' stated preferences (Louviere *et al.* 2000). Stated preferences techniques concern the process of eliciting value for non-market goods (Hall, Kenny, King, Louviere, Viney and Yeoh 2002). Stated preferences can be described as forecasting changes in behaviour in the trade-off between product attributes (Wertenbroch and Skiera, 2002). Therefore, allowing a product preference to be discovered. Measures of preference are known as dominance. Dominance measures are any form of numerical assignment that allows academics to determine that one or more objects being measured is preferred to one another (Louviere *et al.* 2000; Sattler and Voelckner, 2002). One important feature of dominance stated preferences is that it allows investigation of customers' reservation price for hypothetical products (Breidert *et al.* 2006; Wierenga, 2008) and may be used to inform policy-making about customer preferences before conventional markets exist.

As shown in Figure 3.3 there are two paradigms to elicit stated preferences from individuals: conjoint analysis and discrete choice experiments. However, Louviere (2000, p. 1) claims: *"there is considerable confusion amongst academics and*

practitioners about these two paradigms, and it would be fair to say that few researchers actually understand that there is a difference".

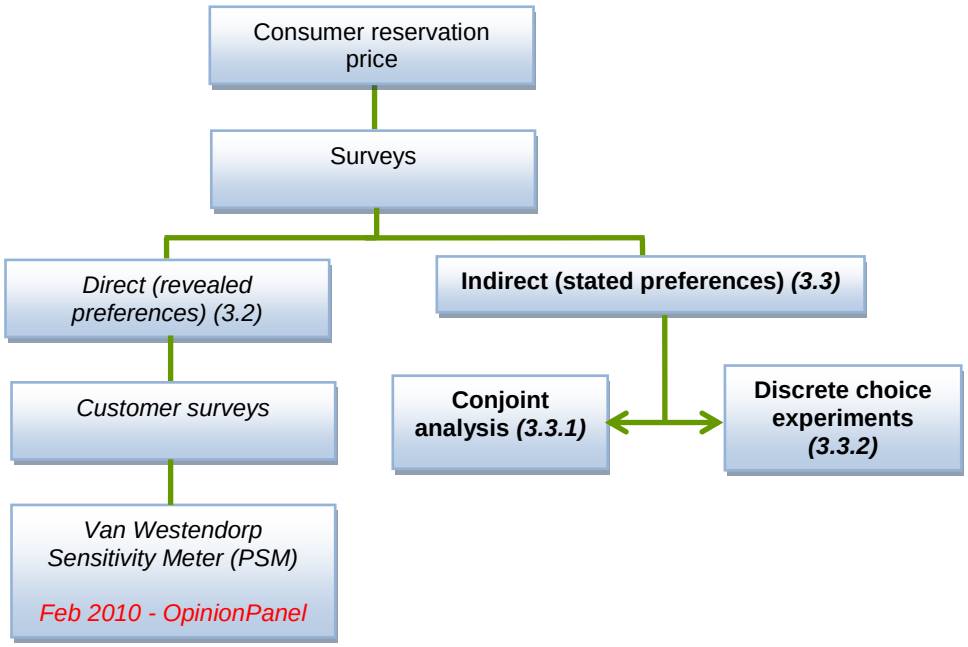


Figure 3.3: The direct and indirect approaches of consumer reservation price (adapted from Breidert, 2006, p. 38

3.4.1 Conjoint analysis

The term conjoint analysis includes a variety of theoretical approaches to eliciting consumer preference (Luce and Tukey, 1964; Green and Rao, 1971; Krieger, Green and Wind, 2004; Rao, 2009; Louviere and Woodworth, 1983; Voelckner, 2006; Breidert *et al.* 2006). First developed in psychology and economics before being introduced into marketing in the 1970s (Green and Wind, 1975), conjoint analysis mathematically represents behaviour in rank order. Alternatives are based on ranking or rating product profiles. Different product profiles are defined by a set of attributes and levels including price (Green and Wind, 2000). It is this ranking that conjoint analysis relies on cross-referencing with mathematical algebraic equations that represents a person's preference for an alternative (Louviere, 2000; Voelckner, 2006). In other words to reveal a person's preference their rank ordering must satisfy a set of mathematical properties.

There are two approaches to developing conjoint analysis. They are adaptive and self-explicated (Breidert *et al.* 2006). The adaptive approach to conjoint analysis involves developing questions in a sequential manner depending upon the responses from an individual to previous questions. Crouch and Louviere (2001) describe the decompositional approach of conjoint analysis as estimating partworths from the product attributes that make up an alternative within a choice set. The alternative to decompositional is compositional. The self-explicated approach of conjoint analysis is classed as compositional (Green and Srinivasan, 1990). This recognises the desirability of levels within each attribute is directly obtained from the respondent and the utility value for an alternative (such as an undergraduate degree course) is comprised from this data specified as a weighted sum of the alternatives desirability (Wierenga, 2008, p. 27). In other words, he suggests that compositional approaches to factor importance is first discovered before being used to access a product's overall attractiveness. Despite being relatively straightforward to develop, compositional approaches are rarely found within the consumer reservation price literature (Netzer and Srinivasan, 2007). Therefore, the focus of this investigation will be on taking a decompositional approach to estimating student reservation price.

In a 1982 survey investigating the application of conjoint analysis in America, Cattin and Wittink (1982) discovered 38% of the companies reported using conjoint analysis to examine consumer pricing. Later, a similar study investigating the use of conjoint analysis reported an 8% increase in the number of studies investigating price. Despite this growth, the number of conjoint studies published between 1994 and 2001 examining consumer pricing fell by 7% (Hartmann and Sattler, 2002), suggesting a number of disadvantages to be associated with the technique. A review of the marketing literature identifies Jordan Louviere and George Woodworth to be the first writers to fully recognise and also criticise the effects of conjoint analysis. Writing in the *Journal of Marketing Research,*

Louviere and Woodworth (1983) describe the main criticism of using conjoint analysis is its approach to measure consumer preference deterministically. As Thurstone (1927) suggested in Section 2.3.1 to measure the utility part of humans' behaviour is immeasurable. This view was further promoted by Kohli and Mahajan (1991, p. 347) who argued that: *"the limitation of this approach is that the profit simulations are based on the assumption that the conjoint data, and hence the predicted profits, are error free"*. In highlighting the problem the writers argue against attempts to measure consumer reservation price deterministically.

Another problem with conjoint analysis concerns its aspiration to satisfy algebraic equations. Using conjoint analysis to discover so called 'utility' is simply theoretically impossible. As mentioned for example in Section 3.1.3 with ranking and rating product attributes, there is also no behavioural theory that underpins conjoint-analysis. Meaning any developments in estimating utility through conjoint analysis have been statistically and methodologically ad hoc (Louviere, 2000). One such study in marketing is presented by Jedidi, Jagpal and Manchanda (2003). In this study, consumer reservation price is based on developing price bundles. The results from the study provided knowledge on different pricing strategies, yet no attempt was made to explain how the results satisfied the theoretical properties of consumer choice. This therefore, suggests that any decompositional studies to estimating consumer reservation price should also be theoretically supported by choice theory. An outline of the issues with conjoint analysis is further summarised in Figure 3.4.

Since it can be recognised that developments in conjoint analysis are based on statistical and not behaviour theory, the next section of this chapter examines how consumer reservation estimates can be elicited using the alternative technique of discrete choice experiments.

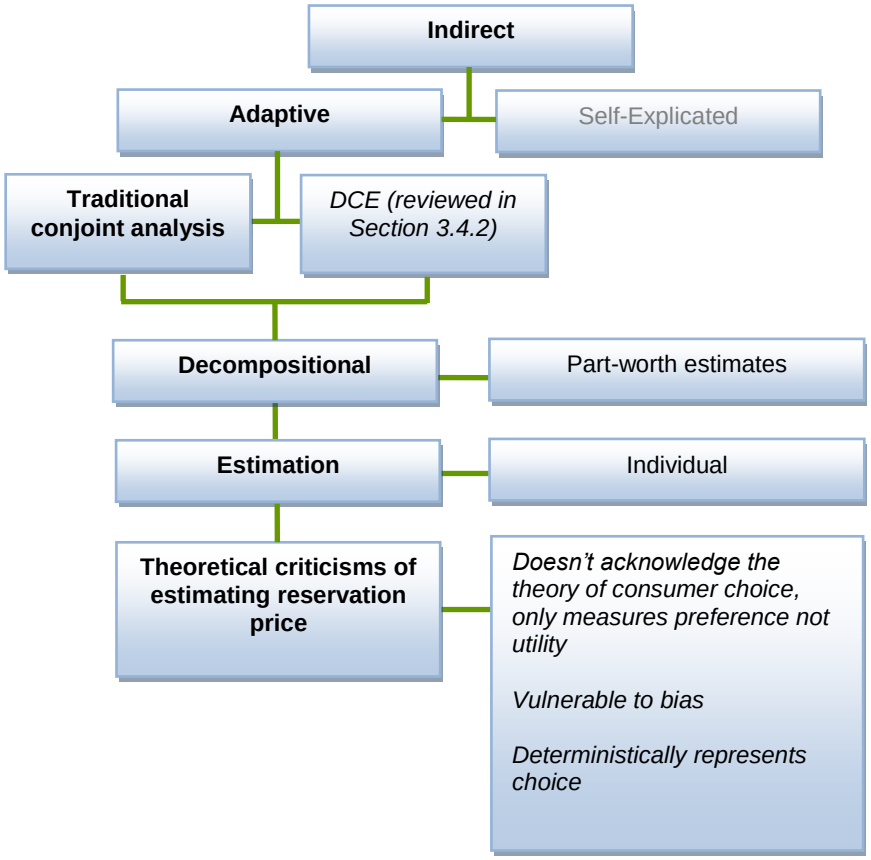


Figure 3.4: The rationale for rejecting traditional conjoint analysis to estimate students' reservation price

3.4.2 Discrete choice experiments (DCEs)

Discrete choice experiments (also known as choice-based conjoint analysis) as a theoretical approach represent goods in terms of their attributes (Lancaster, 1966 – as discussed in Section 2.3) and levels (Louviere and Woodworth, 1983). In terms of a full-time undergraduate degree course, this could include, for example, location, entry requirements and the price of the course. The design of a DCE is similar to that of conjoint analysis. However, the only difference between the two paradigms is within the valuation section. Where conjoint analysis provides a measure of an individual's preference for an alternative, discrete choice experiments calculate an aggregate measure of a population's utility towards an alternative. McIntosh (2003) reports that when summed DCEs can provide a

value for any possible combination of attributes and level. The main advantage of this is that utility for different attributes that make up an alternative can be translated into monetary values.

Indeed, the number of studies that have used DCEs to investigate consumer reservation price have continued to rise over the last 24 years and are further presented in Table 3.1. Despite 8 out the 10 studies being published in 4 star publications[1], many of these studies have focused mainly on mathematical developments and are more commonly limited to investigating product bundling. Although this research provides useful information about consumer choice in, for example, the technology sector, for the information to have relevance on undergraduate course level choices, a broader set of attributes and levels would need to be developed. It is also the case that previous research into consumer reservation price has failed to move away from conjoint analysis, despite major theoretical criticisms being associated with the approach. One explanation for this is that many contributions have been more interested in understanding individual level measurement rather than estimating consumer reservation price aggregately. According to Jedidi and Zhang (2002, p. 1351): *"despite the practical and theoretical importance of the concept of consumer reservation price, its measurement at the individual level in a practical setting proves elusive",* suggesting that despite originating in marketing (Louviere and Woodworth, 1983) most discrete choice studies today are developed in economics.

[1] According to the 2007 Association o0f Business Schools (ABS) quality guide

Number	Reference	Approach used to estimate consumer reservation price
1	(Hauser and Urban, 1986)	Convergent linear programming procedure
2	(Cameron and James, 1987)	Contingent valuation
3	(Kohli and Mahajan, 1991)	Conjoint analysis
4	(Tse, 2001)	Conjoint analysis
5	(Wertenbroch and Skiera, 2002)	Vickery auctions (a direct approach)
6	(Jedidi and Zhang, 2002)	Conjoint analysis
7	(Chung and Rao, 2003)	Bundle model
8	(Jedidi *et al.* 2003)	Conjoint analysis
9	(Voelckner, 2006)	Vickery auctions (a direct approach) and Conjoint analysis
10	(Wang, Venkatesh and Chatterjee, 2007)	Vickery auctions (a direct approach)

Table 3.1: A review of studies that have investigated consumer reservation price

Another point to note is that more recent contributions have focused attention towards direct approaches of estimating consumer reservation price. Two such studies are presented by Voelckner (2006) and Wang and Venkatesh and Chatterjee (2007). However, if consumer reservation price research is going to be used to explore how prospective students will pay for degree courses which they have no experience in consuming, further research is required into indirect approaches such as DCEs.

In contrast to conjoint analysis, DCEs are rooted in the sound behavioural axioms of random utility theory (Louviere and Woodworth, 1983). As discussed in Section 2.3.1, random utility theory assumes part of a consumer's preference towards an alternative is latent and, therefore, random. Consequently, marketing academics can only predict the likelihood that a consumer will ever choose an alternative (Louviere, 2000). It is this presence of a random component that Louviere *et al.* (2000) argues allows random utility theory to explain the behaviour of humans

rather than the behaviour of numbers. Furthermore, it is this stochastic element that has stimulated interest around probabilistic discrete choice models, which recognise the behaviour of various individual choice probabilities in response to changes between the attributes and levels contained with a choice set (Louviere, 2000).

Estimation of choice probabilities can be done using logit or conditional logit (also known as the multinomial logit) models (Keane, 1997). Conditional logit models are preferred as many of the statistical properties have been developed to allow two or more choices to be estimated. Detail into the development of conditional logit including McFadden's (2000) views on the random properties of IID Gumbel distribution is found in Louviere (2000), acknowledging many recent contributions to be highly mathematical. Two studies that have used conditional logit models to examine student choice are presented in Punj and Staelin (1978) and Holdsworth and Nind (2005). Closer inspection revealed the results from these studies informed marketing academics about the attributes that influence student choice at a university level. Further detail of the underlying properties of conditional logit models is found in Section 4.2.5.2 with the main theoretical advantages of DCEs presented in Figure 3.5.

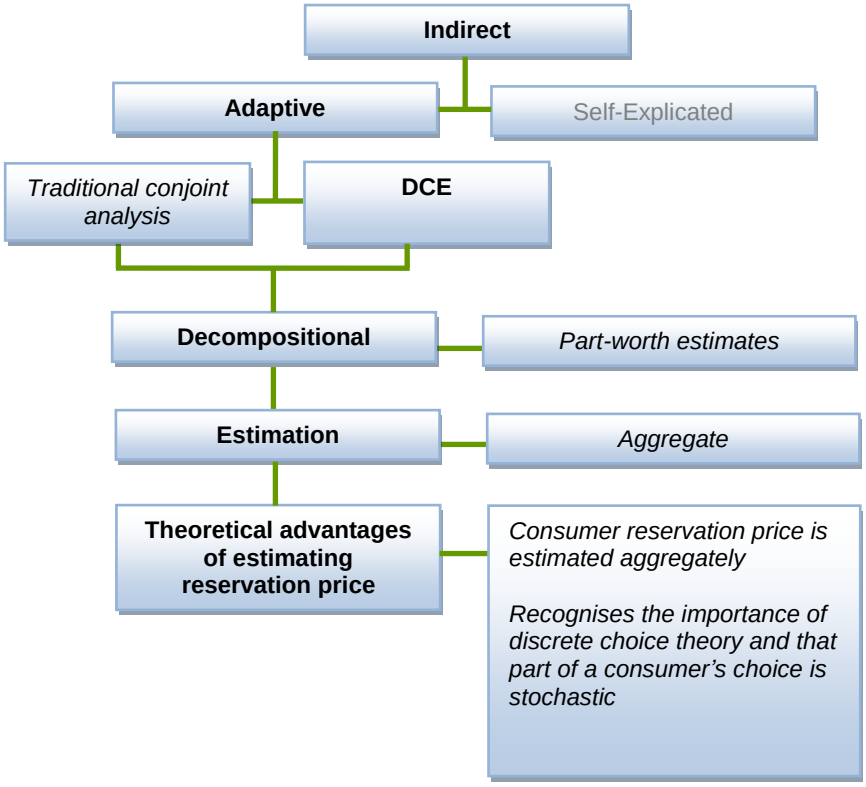


Figure 3.5: The rationale for using DCEs to measure consumer reservation price

3.4.3 Contingent valuation

An alternative indirect approach of measuring consumer reservation price is through contingent valuation (see Figure 3.6).

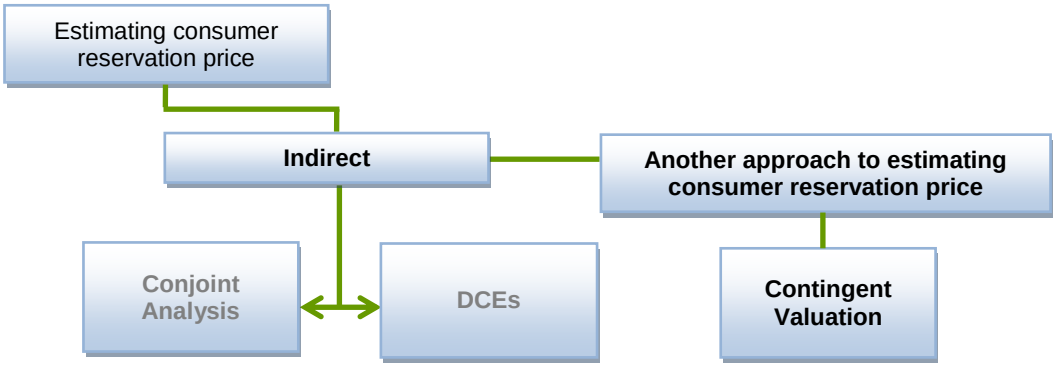


Figure 3.6: Other Indirect approaches of estimating reservation price found outside the marketing area (adapted from Breidert, 2006, p. 38)

First applied by Davis (1963) to test marginal valuation of marine woods in America, contingent valuation involves a survey approach to eliciting preference through asking respondents how much they would be willing to pay for a change in policy' for example, reducing patient waiting times to a doctor (Acton, 1973; Mitchell and Carson, 1989; Louviere *et al.* 2000; Boyle, 2003). Well cited within health and agricultural economics (Mason, Baker and Donaldson, 2008; Hensher and Button, 2000), the number of contingent valuations studies are continuing to rise. Despite the theoretical attraction for contingent valuations studies, a study by Rowe and Chestnut (1983) demonstrated theoretical inconsistency to surround the approach. This prompted a review by Carson and Mitchell (1989) who constructed a new and theoretically accurate approach to developing contingent valuation studies. Despite its significant contribution to the contingent valuation literature, Carson and Mitchell (1989) acknowledged contingent valuation studies to be increasingly threatened by bias. One of the major criticisms concerned the use of payment vehicles (or individuals method of payment that produces a hypothetical measure of respondents reservation price, e.g. customers may be given the choice to pay in cash or using vouchers) implying contingent valuation studies to more commonly elicit consumers' reservation price through direct approaches. Boyle (2003) attempted to theoretically update Carson and Mitchell's contingent valuation study design. The findings from the 2003 study reported contingent valuation studies to be more applicable to testing direct approaches, identifying contingent valuation to be less successful than conjoint analysis and discrete choice experiments at measuring preference for a non-market good.

On a purely practical level contingent valuations are difficult when trying to replicate real market scenarios. In one of the first critiques of contingent valuation, Scott (1965, p. 37) argues: *"Ask a hypothetical question and you get a hypothetical answer"*, implying early contingent valuation investigations to lack an

element of realism. Indeed, Miedzybrodzka, Shackley, Donaldson and Abdalla, (1994) and later Kanninen (1995) discovered contingent valuations studies to overestimate consumer reservation valuations by 25%. This indicated that contingent valuations are an inaccurate and resource expensive approach to measuring utility. A review of this work by the National Oceanic and Atmospheric Administration (NOAA) panel identified the need to incorporate closed questions choice sets to elicit consumer reservation values (Arrow, Solow, Portney, Leamer, Radner and Schuman, 1993) as recognised within DCEs. Indeed, a more recent study by Kennedy (2002) found little difference in value of consumer estimates between direct and indirect data using closed questions thus identifying estimates between market and hypothetical preferences to be similar.

Another concern with contingent valuations is that the approach is vulnerable to 'yea-saying' (Blamey, Bennett and Morrison, 1999). 'Yea-saying' occurs when respondents perceive giving an answer as being socially desirable (Bateman *et al.* 2002). Open-ended questions can avoid 'yea-saying'. However, asking respondents how much they would be willing to pay can increase levels of cognitive strain, further increasing the threat of non response rates (Severin, 2001). In an attempt to reduce the threat of 'yea-saying' Bateman *et al.* (2002) again draws attention to the benefits associated with discrete choice experiments. DCEs appear to reduce levels of cognitive strain and improve accuracy by only asking respondents to ascribe preference to one of two options (i.e. Course A or Course B).

To summarise, this section has shown, despite there being a number of different theoretical approaches to estimating consumer reservation price, that in order to discover a consumer's utility towards a product, there has to be overarching behavioural theory (Louviere, 2000). Conjoint analysis cannot be used to measure utility and, therefore, does not offer a theoretically robust approach to estimating student reservation price. The contingent valuation approach is more suited to estimating consumer willingness-to-pay from an economic perspective

which is again outside the scope of this study. It is, therefore, the contention of this thesis that further investigation into the development of consumer reservation price research should follow DCEs.

3.5 Using DCEs to estimate consumer reservation price in marketing

When looking at using DCEs in marketing, many studies have either been theoretically developed or applied. In terms of theoretical advances, Volckner and Sattler (2005) acknowledged the need for further research into the allocative and informational role of price, reporting that even more research is needed into the full effect of price. In Australia, Lockshin and Halstead (2005) used a DCE to investigate consumer choices between Canadian and Australasian wine consumers. The results from the study found wine drinkers' utility from different countries could be estimated using the approach claiming: *"it is essential to understand the ways in which consumers relate to wine during the purchase decision-making process. If wine companies better understood the key attributes that drive consumer choice, they could better develop these attributes via the opportunities presented in the marketing mix"* (Lockshin and Halstead, 2005, p. 3), implying that many recent approaches use DCEs to examine the utility towards a product rather than estimating their reservation price.

When estimating utility for student choices, only one study to date has used a DCE. The research which was designed to investigate university level decision making by Year 12 and 13 students was conducted in New Zealand (Holdsworth and Nind, 2005). From a purely practical point of view, the results show that hypothetical choices can be discovered using Year 12 and 13 students. However, in terms of consumer reservation price the results are limited as the research failed to investigate how much prospective students would be willing to pay to attend university. Furthermore, the writers ignored the need to investigate the attributes that influence course level choices, demonstrating no previous

research has been used to investigate the utility assigned to the attributes that affect course level choices.

3.5.1 The gap within the indirect consumer reservation price literature – the way forward

It is clear from the contributions presented in Table 3.1 that more research is needed into indirect approaches of estimating consumer reservation price. More specifically, further research is required using indirect approaches that incorporate behavioural consumer theory. To date, all extant published work has ignored the need to base their research on choice theory to guide their reservation price research. The only explanation for this lack of underlying theory is that previous authors have been more interested in satisfying the mathematical axioms incorporated in ordinary linear regression than understanding the way consumers behave in their reservation price decisions. However, this is not a new problem as Louviere and Meyer (1976, p. 480) describe how: *"a growing number of researchers in psychological measurement and mathematical behaviour theory are giving overdue recognition to the integral relationship between theory and measurement"*. Therefore, suggesting when researching consumers' reservation price, greater attention has to be given to developing DCE research that measures utility based on random utility theory.

From a marketing perspective, further applied research is required in the field. It is without doubt that most research into DCEs has been published from a health, environmental and transport economic areas. The lack of consumer reservation price research using DCEs shows that there is scope for further work in this area. Appendix B acknowledges the application of DCEs in areas discussed above highlighting the strong demand for estimating, in this case, consumers' willingness to pay based on sound consumer theory.

This thesis looks to investigate how DCEs as a theoretical approach can be used to discover student reservation price for full-time undergraduate degrees. To do this, the thesis first looks to understand the guiding principles associated with designing a discrete choice experiment to be used to discover prospective students' reservation price for full-time undergraduate degrees. A review of these principles is outlined in the following section.

3.6 Guiding principles for designing a DCE

There are a number of stages which are involved in using a DCE to estimate consumer reservation price. Detail on the various stages is shown in Figure 3.7.

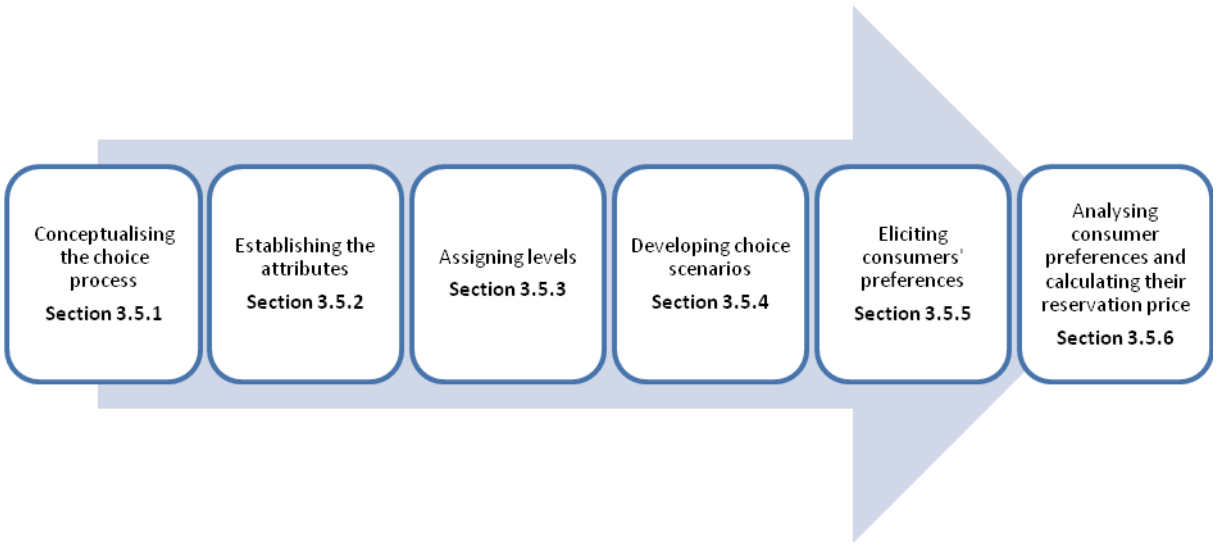


Figure 3.7: The stages involved in conceptualising a DCE

3.6.1 Conceptualising the choice process

The first stage of developing a DCE is to determine what type of choice experiment will be designed (Bateman *et al.* 2002 and Lancsar and Louviere, 2008). In DCE, experiments can be separated into two designs. They are multinomial and binary designs (Street and Burgess, 2007). Multinomial designs examine choice when the number of alternatives is greater than two. Under this process, respondents have the option to opt-out of selecting either alternative A or alternative B. An advantage of incorporating an opt-out is that it provides a realistic approach to investigating choice, acknowledging the decision to attend

university is not to be forced (Foskett and Hemsley-Brown, 2001). Similarly binary designs provide a well cited approach to investigating choice when a decision for a set of alternatives is dichotomous (Street and Burgess, 2007; Louviere and Woodworth, 1983). One of the most important benefits associated with binary designs is that it offers a more straightforward approach to data collection (Street *et al.* 2005), particularly when working with a small number of product attributes. Binary designs are also commonly found when investigating consumer choice for public sector businesses (Carson *et al.*1994), suggesting that they offer an extremely flexible approach to understanding the measurement of utility.

3.6.2 Establishing the attributes

The identification of attributes has attracted a great deal of interest within the marketing and economic literature (Hall *et al.* 2006; Bateman *et al.* 2002). Street and Burgess (2007) describe the process of selecting attributes as extremely important in preparing to administer a DCE. Sadly, however, the lack of theoretical guidance in examining how to select attributes is unhelpful (Coast and Horrocks, 2007; Wilkie and Pessemier, 1973). Ryan *et al.* (2008b) are sympathetic claiming: *"There are no hard and fast rules used to determine the attributes and levels presented to respondents in a DCE"*, suggesting the process of determining attributes to be an extremely individualistic process.

Adamowicz, Louviere and Swait (1998) describe secondary data to provide an insight into the attributes that influence consumer preferences. However, Louviere *et al.* (2000) along with Pitchforth *et al.* (2007) acknowledge qualitative data can offer a greater insight into designing a quantitative survey. Furthermore, Coast and Horrocks (2007) claim semi-structured interviews offer a flexible approach and provide an opportunity for respondents to introduce new decision making components. Lancsar and Louviere (2008) agree and support both the application of qualitative (location) and quantitative (cost in pounds) attributes in order to discover the individuals' preferences. A further consideration includes

selecting the right number of attributes, implying an insufficient range of attributes can cause ambiguity (Lancsar and Louviere, 2006; Smith, 2003). However, the chosen attributes must be plausible and further quantifiable to the sample of respondents. This suggests that there is a need to select attributes that are easily recognised amongst the sample of respondents (Coast and Horrocks, 2007).

Once the attributes have been identified, great care has to be taken to justify that an appropriate payment vehicle has been selected (Ryan and Wordsworth, 2000). Payment vehicles (as described in Section 3.4.3) produce a hypothetical measure of respondents' reservation price (Smith, 2003). Slothuus Skjoldborg and Gyrd-Hansen (2003) show that payment vehicles more commonly measure reservation price through assigning an overall price to the product alternatives. Despite this approach being the most common, a number of studies (McConnell, 1990 and Campbell, Hutchinson and Scarpa, 2008) have asked respondents to consider paying for a product by paying higher tax although these are typically less common, as most products are bought at a overall price. The importance of selecting the correct payment vehicle is crucial as inappropriate payment vehicles can increase the chance of hypothetical bias (Smith, 2003). Therefore the method and mode of payment should be clearly stated, demonstrating a level of certainty (Bateman *et al.* 2002). Following this, the individual responsible for paying the price should be clearly defined and in line with respondent expectation. In addition, the duration of payment should be clearly defined to avoid uncertainty. Surprisingly little is written concerning the length of payment. However, one-off payments are more common within the environmental and transport literature, implying staggered payments option to be unpopular with DCE research (Slothuus Skjoldborg and Gyrd-Hansen, 2003).

3.6.3 Assigning levels (values) to each attribute

Following the identification of attributes, levels have to be discovered. Levels concern the value placed upon attributes (Ryan and Wordsworth, 2000). Again the academic literature fails to demonstrate how levels should be allocated. Two important considerations include, first, that levels should be realistic, with major consideration towards target respondents. Secondly, levels should be equally spaced representing the full range of values (Ryan and Woodworth, 2000). Furthermore, levels should be kept as realistic as possible (Louviere *et al.* 2000), preventing respondents' utility from being over estimated. Unrealistic values ascribed to attributes can prevent true representation of utility implying that there is a need for careful consideration when allocating levels.

Bateman *et al.* (2002) describe the growing acceptance to incorporate qualitative research to ascribe values. Focus groups and face-to-face interviews are popular within marketing research providing the opportunity to gain firsthand experience when working with target respondents (Lancsar and Louviere, 2008; Pitchforth *et al.* 2007; Coast, 1999; Louviere *et al.* 2000; Coast and Horrocks, 2007). However, lack of rigour suggests many studies prove to be inconsistent in their approach to collecting and analysing qualitative data and cast concerns regarding the overall accuracy of the study.

3.6.4 Developing choice scenarios using experimental design techniques

Following the collection of attributes and levels, choice sets are developed. In order to develop a DCE that contains choice sets that allow utility to be measured, great emphasis has to be placed upon understanding the experimental components necessary to construct a DCE design (Louviere and Flynn, 2010). Experimental designs provide the means to select subsets of the total set of possible alternatives for use in an experiment (or survey) in a statistically efficient manner (Bateman *et al.* 2002). First developed by Sir Ronald Fisher in the 1920's, Street and Burgess (2007) describe how experimental

design provided Fisher with the opportunity to investigate the effects of (k) factors on yields of crops. Closer examination reveals the discovery of choice sets (or treatment combinations), in which (k) factors and combinations of levels could be developed.

Louviere *et al.* (2000) identify two approaches to constructing choice sets, namely 'factorial and fractional factorial'. Factorial designs offer a holistic approach to developing choice sets, combining each level of each attribute to provide an account of all possible interactions (Ferrini and Scarpa, 2007; Green and Srinivasan, 1990). Street and Burgess (2007) represent a factorial design as a function when *q*th factors (attributes) have L_q levels produce the total possible number of treatment combinations. Therefore, describing treatment combinations as the possible number of combinations that each level has with each individual attribute (Amaya-Amaya *et al.* 2008); for example, 6 (*q*th) attributes at 4 (L_q) levels then the possible number of profiles would = 4,096 (4^6). This is represented in Figure 3.8:

$$L = \prod_{q=1}^{k} l_q$$

Figure 3.8: A factorial design containing all possible treatment combinations

The main criticism towards factorial design is their size (Louviere *et al.* 2000; Street and Burgess, 2007; Street *et al.* 2005). In fact Amaya-Amaya *et al.* (2008, p. 19) argue that: *"for most practical situations, the full factorial design is often very large and not tractable as it would be too cost-prohibitive and tedious to have participants consider all possible combinations"*, suggesting factorial designs to be less commonly applied in the construction of a DCE. The alternative to factorial designs is fractional factorial designs. These statistically represent a subset of all possible attributes and levels to produce a reduced number of treatment combinations (Louviere *et al.* 2000). Bateman *et al.* (2002)

acknowledges this is becoming increasingly more practical, specifically when undertaking a DCE with a larger number of attributes and levels. However, Street and Burgess (2007) do suggest one possible weakness of using factional factorial designs is that they do dismiss thousands of possible design combinations, ultimately reducing the model's overall effectiveness (Street and Burgess, 2007). Furthermore, greater emphasis is placed on maintaining a statistically efficient design. This implies that more care is needed to test for rigour when developing the fractional factorial design (Hensher *et al.* 2005). Despite concerns regarding statistical efficiency, cognitive strain from fractional designs ultimately reduces cognitive efficiency (Severin, 2001; Payne, Bettman and Johnson, 1993). This would indicate fractional factorial designs to be increasingly more common in consumer reservation price research.

In experimental design, four tests can be conducted to test for efficiency; namely, 'orthogonality, utility balance, minimal overlap and level balance' (Huber and Zwerina, 1996). Orthogonality can be assumed when there is a linear relationship between all attributes (Green and Srinivasan, 1990) meaning that not one attribute has a dominant position (Street and Burgess, 2007; Street, Burgess, Viney and Louviere, 2008; Dellaert, Borgers and Timmermans, 1996). Early approaches to testing for orthogonality in DCE were obtained through the Hahn and Shapiro (1966) catalogues. This provided a collection of orthogonal designs that acted as a blueprint to creating treatment combinations for the overall survey design. Despite being popular with the early indirect techniques, the catalogues fail to represent a modern approach to developing DCE designs, leaving doubts concerning accuracy. Today orthogonal designs are more commonly taken from Neil Sloan's website (Sloan, 2009). This free and open resource provides the most up-to-date library of orthogonal designs available to DCE researchers.

However Burgess and Street (2003) argue that not all non-linear designs have to be orthogonal. This alternative approach towards experimental design is known

as producing D-optimal designs (Ferrini and Scarpa 2007). However, Ryan *et al.* (2008b) argues that D-optimal designs create greater complexity and are better often left to well experienced DCE researchers. This would suggest that orthogonal designs are to be more commonly found within the DCE specific literature.

Huber and Zwerina (1996) believe utility balance can improve efficiency by 10-50%, further reducing the threat of dominant levels. The approach to checking design estimates has long been good practice within choice experiments, reducing the error in estimating the design parameters (Street *et al.* 2008). However, approaches to reducing utility balance can prove difficult unless using the assistance of computer software (Lancsar and Louviere, 2008). Surprisingly only 5% of published work provides an explanation behind their approach to ensuring efficiency when constructing treatment combinations (Ryan *et al.* 2008a). Over reliance on computer software neglects to show an appreciation of the underlying theory, creating a theoretical gap when reviewing the construction of modern DCE designs.

Advances in computer software are providing a catalyst to developing orthogonal and statistically efficient choice scenarios. Eight software packages are frequently cited within the DCE literature, including: Statistical Analysis System (SAS), SPEED, STATA, PASW Statistics 18 (formally SPSS), Sawthooth, Ngene, Sloan's catalogue and Street and Burgess DCE computer software (Holdsworth and Nind, 2005; Ryan *et al.* 2008a). However care has to be taken as many contemporary DCE designs may be statistically efficient but theoretically unjustified within the contemporary DCE literature (Street *et al.* 2008).

A further consideration of statistical efficiency includes minimum overlap, with the probability that attribute levels repeatedly occurring should be kept at a minimum (Huber and Zwerina, 1996). Failure to enforce minimum overlap can leave a study without any value added, preventing any new additional information being

discovered (Street *et al.* 2008). Finally level balance ensures that each attribute occurs with equal frequency (Street *et al.* 2008). This ensures new information is discovered in the optimum manner.

Following tests for statistical efficiency, the consideration of choices is important (Ryan and Skåtun, 2004). Forced choice provides no opportunity to avoid showing preference, asking respondents to opt for either A or B (Street and Burgess, 2007). Yet forcing respondents to choose between A or B has proven to increase the number of non-response rates (Ringburg, Buljac, Stolk, Van Lieshout, Van Beeck, Patka and Schipper, 2009). This would indicate an inaccurate representation of respondents' reservation price (Ryan and Skåtun, 2004). However non-demander or opt-out options have proven popular within contemporary health economic literature, implying the need to reduce cognitive burden on target respondents (Hanley, Mourato and Wright, 2001). Another benefit suggests non-demanders to reduce bias, preventing mistaken estimates of willingness to pay (Boyle, Holmes, Teisl and Roe, 2001; Ryan *et al.* 2008b).

An unpublished study carried out by Ryan and Gerard as cited by Ryan and Skåtun (2004) discovered only two studies published between 1990 and 2000 had incorporated a non-demander option, suggesting the inclusion of unforced decisions to be disregarded amongst early DCE researchers. However, the growth in applications for investigating consumer choice in publicly subsidised goods, such as the NHS has increased the popularity of non-demander options as offering patients treatment cannot be forced. This could be the case in another publicly subsidised market such as HE, as a prospective student may not consider course A or course B to be suitable, deciding to enter straight into employment and, therefore, not forced to enter into HE. This identifies the provision for prospective students to opt-out of the decision making process to be considered reasonable (Carson, Louviere, Anderson, Arabie, Bunch, Hensher, Johnson, Kuhfeld, Steinberg, Swait, Timmermans and Wiley, 1994).

One final consideration concerns the number of choices per survey (Louviere *et al.* 2000). Frequency of choices is extremely project specific, dependent upon the aim of the research (Ryan *et al.* 2008b). Too few choices can prevent scarce data from being retrieved, yet surveys containing a large number of choices can increase the threat of response error (Ryan *et al.* 2008a). Therefore, the need to pilot survey designs is crucial before targeting the sample.

Technical advice for designing and administering a sample is provided by Ben-Akiva and Lerman (1985). The writers assign a full chapter to arguing the need for accurate sampling within DCE design, illustrating that a carefully designed survey can reduce the need for additional resources. Despite providing a valuable insight into the construction of DCE sampling designs, the chapter chooses to ignore approaches to conducting a census. In fact Louviere *et al.* (2000) again disregard how to develop a census of the population. Yet a number of studies are found to contain a convenience sampling approach to measuring preference through consumer reservation price, arguing DCE to include non-probability approaches to measuring utility (Kleinman, McIntosh, Ryan, Schmioer, Crawley, Locke and De Lissovoy, 2002; Ringburg *et al.* 2009).

The need to understand how respondents react to a survey is vital to the success of a DCE (Wagner, Hu, Dueńas and Pasick, 2000). Piloting designs are frequently developed and tested with a proportion of the target respondents. One of the most important benefits of piloting can ensure that respondents confirm that the right attributes and levels are included within a DCE study, providing theoretical certainty for a finite set of variables. Another advantage proves piloting to offer the opportunity to receive feedback on the main survey instrument, identifying key areas for improvement. Piloting can further provide theoretical justification that the survey technique is the most appropriate method of data collection, proving accessible by target respondents. Finally, piloting can ensure that the wording of the questions is clear and easy for respondents to follow.

The number of respondents to be included within a pilot study is well discussed within the DCE literature. The inclusion of too many respondents can increase the threat of diminishing returns, proving ineffective allocation of resources. Yet in health and environmental economics, the application of piloting is extremely common. However, the number of respondents included within a pilot is often project specific (Louviere *et al.* 2000), placing little emphasis on constructing an average sample size. Despite this ambiguity, the use of 30-40 respondents provides a feasible chance of receiving valuable data, proving a cost effective approach to collecting data (Hensher *et al.* 2005).

Although piloting has a number of strengths, there are number of weaknesses. The main criticism concerns the resources necessary to administer a pilot study. Pilot studies are often time-consuming and involve thorough planning. Yet failure to administer a pilot is extremely uncommon within DCE design (Hensher *et al.* 2005). This demonstrates piloting to provide an invaluable opportunity to pre-test survey designs, further gaining firsthand experience with target respondents (Lancsar and Louviere, 2008).

3.6.5 Eliciting consumers' preferences

Methods of distributing surveys are well documented within the DCE literature (Dillman, 2000 and Carter and Curry, 2010). Postal surveys are the most commonly acknowledged method of generating preferences (Lancsar and Louviere, 2008). Low response rates and rising research costs, have led to postal surveys becoming unpopular (Ryan and Gerard, 2003; Ryan and San Miguel, 2000). Face-to-face interviews offer a higher response rate, but are often restricted to smaller studies (Wagner *et al.* 2000). Web-based studies are becoming increasingly popular, with the increase in modern technology. Dillman (2000) believes web-based surveys offer a number of cost advantages over traditional paper administered surveys, however exceedingly high start-up costs have led to little demand or application within the DCE literature.

Self-administered surveys involve respondents filling out the survey before returning the completed survey to the researcher (Louviere *et al.* 2000). Self-administered surveys have proven successful when administering DCE in HE, providing high response rates and low levels of cognitive efficiency (Holdsworth and Nind, 2005). Self-administered surveys also allow for a wide range of demographic information to be taken, more commonly after respondents have completed the choice sets (Hensher *et al.* 2005). Figure 3.9 provides an example of a self-administered survey. Respondents that circle Course B demonstrate their reservation price is £3,000 greater than attending Course A, proving Course B to have greater utility than Course A.

Choice 1	Course A	Course B	Neither nor
Number of UCAS points	280	320	
Amount of teaching per week (hours)	20	15	
Fee price (£)	3000	6000	
Please place a tick on the screening test you would choose	☐	☒	☐

Figure 3.9: An example of a choice task in a DCE

3.6.6 Analysis of DCE data

Once the surveys have been collected, the data can be analysed. Traditionally, data analysis takes place over seven steps (Gerard, Shanahan and Louviere, 2008 and Ryan, Watson and Gerard, 2008) as displayed in Figure 3.10.

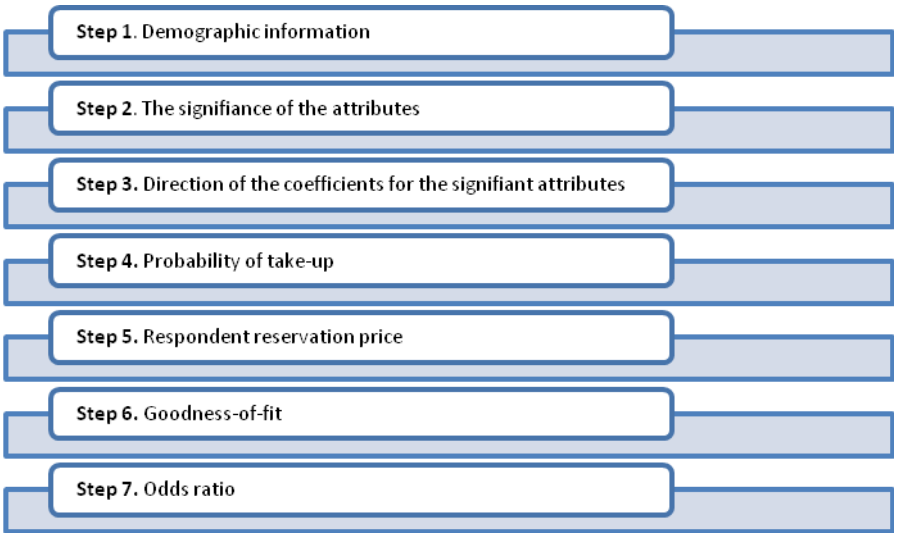


Figure 3.10: The seven steps of data analysis

First the respondents' demographic data is examined. This can be used to identify any trends in the data relating to for example the most common income group or parent/guardian occupation. Information on respondent characteristics can provide a clear insight into how much different groups of respondents are willing to pay for a particular good or service (this is discussed in Section 8.4.2). Following this, the significance of the attributes is then examined. A review of the DCE literature traditionally finds attributes to be significant at a 95% confidence level (Hensher *et al.* 2005) and, therefore, has an impact on the probability of choosing an alternative. One possible problem is that the attributes incorporated in the research fail to have a significant influence on the consumer choice of alternative. However, this is unusual and it is more often the case that attributes found to be significant will depend on the level of the attribute (Louviere *et al.* 2000). Finally, the joint significance of the attributes is tested as Louviere *et al.* (2000) argue that it is important that the respondents are viewing the attributes independently. Indeed, Section 4.2.5 presents detail on how the procedure was developed for this research project. Once the significance of the attributes is discovered then the direction of parameter estimates (or coefficients) can be

explored. This involves investigating what effect individual attributes have on respondents' level of utility (Ryan *et al.* 2008b). To illustrate this point it could be assumed that the attribute 'accommodation' at two levels, moderate 1.96 and good 2.13 shows respondents associate a higher degree of utility with good accommodation than moderate. In other words, the main advantage of this test is that it can explain how much respondents' utility changes depending on the level of the attribute. Furthermore, the estimates from these coefficients can be used to understand what probability of consumers will choose an alternative at different levels of price. Initially an indirect utility function is computed for the independent variables that make up the DCE before the utility for each independent variable is multiplied by the natural logarithm. Indeed further detail on the construction of this utility function is found in Section 4.5.2.

Following examination of the probability estimates, consumer reservation price can be calculated. Ryan *et al.* (2008b) argues that when cost is included in a DCE, consumer reservation price can be estimated. They go on to explain that this can be calculated by dividing the value of a parameter estimate taken from the attribute, e.g. 'accommodation' by the parameter estimate taken from the cost attribute. Another way of illustrating this is when examining students utility for first year accommodation, *everything else is equal* respondents reservation price for being located close to the university campus - $(\beta_1/\beta_£)$ = £115. It is important to note that consumer reservation price estimates can only be developed for attributes that are significant and, therefore, have a positive influence on respondents' choice of alternatives. The next stage is to examine the models overall goodness-of-fit. Measuring goodness-of-fit can be described as conducting a number of tests that measure how well the model estimates respondent choices (or observations). A detailed review into the different goodness-of-fit tests is found in Long and Freese (2007), although it is worth

noting that these tests vary depending on the model used to analyse the DCE data.

Finally, the data analysis procedure finishes by estimating the odds ratio. A review of the extant published research shows rising demand for the procedure (Hensher *et al.* 2005), which investigates the probability of choosing an attribute levels by controlling the alternative specific constant. Ronning (2002) describes the alternative specific constant as an attribute that is identical to all respondents and provides a clear insight into the attributes that have the highest preferences. It is worth noting that this section has only presented a brief outline of the principles required to design a discrete choice experiment. The full extent of developing a discrete choice experiment is reported in the next chapter.

3.7 Towards a preliminary model to estimate student reservation price

Whilst a review of the extant published research into estimating student reservation price has recognised a number of attempts, research using 'indirect' techniques remains untested. A critical review of these techniques reveals DCEs appear to provide the most theoretically robust approach to calculating students' reservation price, based on the underlying theory of consumer choice. Such an approach would provide new opportunities in the marketing field and present academics with an alternative approach to estimating consumer reservation price based on the choices from current undergraduate students.

As with the attributes that influence student choices, a review of the course level decision making literature finds only two studies (James *et al.* 1999 and Maringe, 2006) have researched the attributes that prospective students consider important when choosing an undergraduate degree. In light of this and based on Maringe's (2006) most recent recommendations, the attributes that influence university level decision making were also examined. This is because such a finite number of attributes is currently known to influence course level choice that more investigation into the other attributes that influence course level choice is

needed. Therefore, the attributes most commonly cited to influence course level decision making were highlighted in alphabetical order in Section 3.1.2 and are entry requirements, facilities, graduate employment, location, cost of fees, quality of teaching, reputation, safety and type of course. In this section, the attributes included in this model will be used to construct a preliminary model for ascribing monetary values to the certain attributes found to have a significant influence on choosing a full-time undergraduate degree course. These attributes are highlighted below in Figure 3.11. Nevertheless Louviere (2000, p. 2) explains how: *"Once attributes are identified, they must be assigned levels or values that represent their range of variation in the decision context of interest. As with attribute identification, there is little consensus as to how this should be done";* in other words the development of a DCE realises on more than just attributes; the associated levels of these attributes is vital to modelling the student decision making process and in turn estimating their reservation price. Furthermore, Hensher *et al.* (2005, p.93) describe how: *"experience has shown that many markets provide limited variability in the levels of attributes we wish to use for modelling purposes"*. Indeed, a closer inspection of the attributes in Chapter 3 found no previous published work on the levels associated with each of the attributes. Therefore, suggesting that for this research project, discovering the levels associated with the individual attributes is difficult and will require further research. From the review conducted in Chapters 2 and 3, Figure 3.11 presents a preliminary model for this research project. This contains the attributes found to be important when choosing a degree course, along with the indirect paradigm of DCEs. The following chapter will outline how the DCE was developed. The results from validating the attributes and levels are presented in Chapter 5.

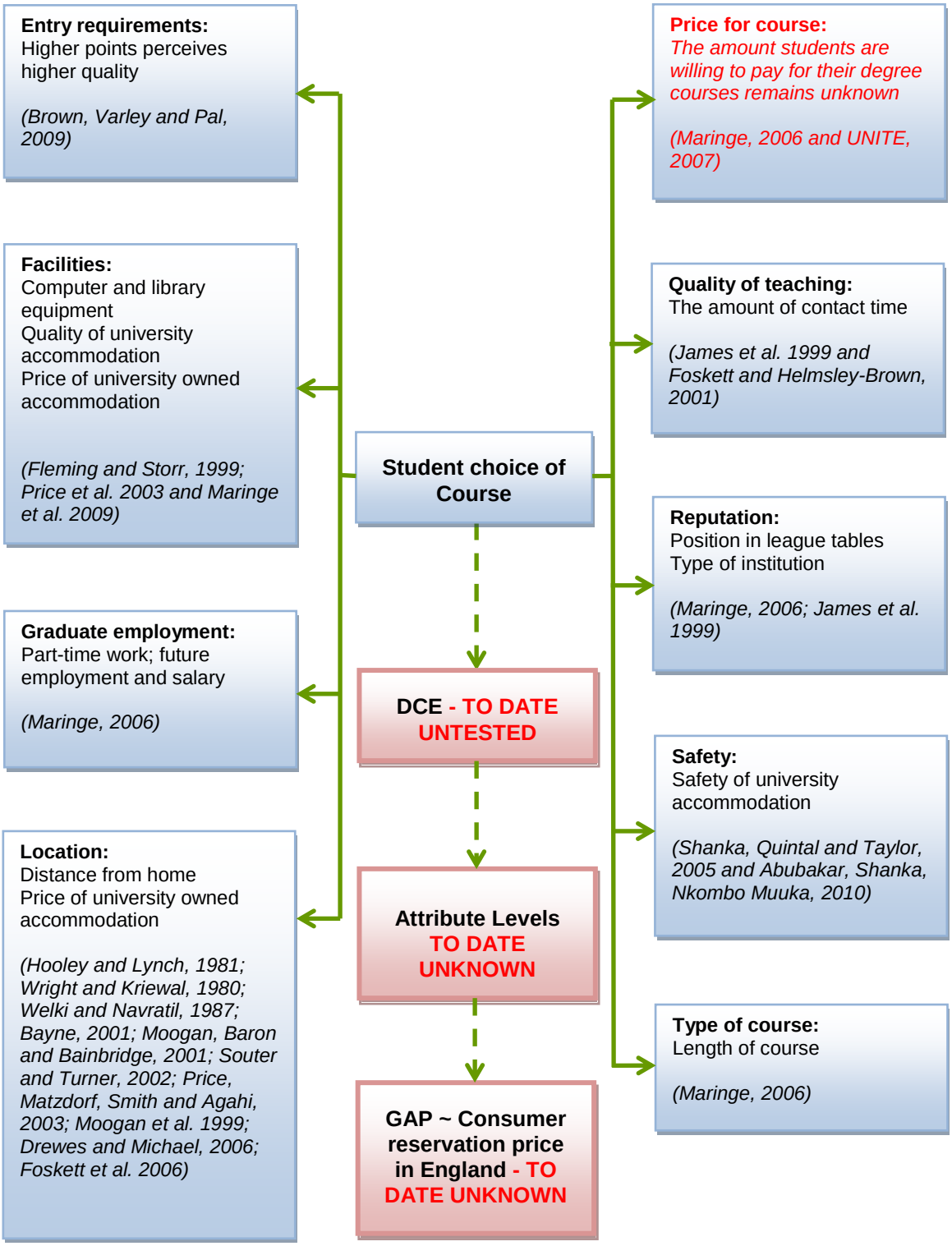


Figure 3.11: A preliminary model to estimating student reservation price for the attributes that influence student choice of undergraduate degree course

3.8 Chapter summary

This chapter began by presenting a review of the student choice literature as a foundation to exploring the literature on student reservation price. Closer inspection of the student choice literature suggested that little research exists to have examined the attributes that influence student choice of course. Although these studies targeted prospective students to investigate student choices a review found that existing research failed to discover student choices in a theoretically accurate manner. More specifically they failed to acknowledge the theory of consumer choice.

From here this chapter has rejected the term Willingness-to-pay for consumer reservation price in taking a marketing perspective to understanding how students assign monetary values through product choices. Through the definition of consumer reservation price, the importance of eliciting students' utility for a degree course was highlighted. In fact, a review of existing approaches to measuring students' reservation price was presented showing clear evidence for concern. The major concerns were that existing approaches failed to measure students' reservation price supported by the theory of consumer choice. As a result indirect approaches to eliciting student reservation price were presented with an emphasis on DCEs. The core reason was that the discrete choice experiments are the only indirect approach to acknowledge the discrete choice and random utility theory. Yet despite the theoretical advantages of estimating consumer reservation price, no previous studies in marketing have examined prospective students' reservation price for full-time undergraduate degrees. This was confirmed with help from the review in Section 3.5 showing only one other previous marketing study to have used a DCE in HE. The results from this study confirmed that DCE research could be applied to prospective students; however, the study failed to elicit students' reservation price, leaving a gap within the

existing marketing literature. Chapter 4 presents in detail on the DCE developed for this study.

Chapter Four

Research methodology and methods

4.0 Introduction

Up to this point the thesis has mainly been concerned with the critical debate around marketing and Discrete Choice Experiment (DCE). This chapter provides insight into the methodological approach taken and details of the data collection methods used. The methodology is intended to assist in answering the research question: *"How can discrete choice experiments provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education?"* Therefore the overall objective of this chapter is to develop a DCE to elicit indirectly student utility for the attributes that make a degree course.

This chapter is presented in the following way. The first section discusses the major components incorporated within the research project including the epistemology, theoretical perspective, methodology and methods used for data collection. Following this, the 5 stages used in this approach to construct the DCE are explained. This will be followed by a review of the ethical issues considered in this thesis before finishing with a summary of the limitations of the study.

4.1 Epistemology

Research philosophies can be described as providing a framework of reference, guiding ideas and confirming a research strategy, (May and Williams, 1998). Philosophy contains important assumptions about how people view the world (Saunders, Lewis and Thornhill, 2009). In social research, epistemology can be described as the nature of knowledge, providing a philosophical foundation to the methodology embedded within a research project (Crotty, 1998). Early contributions identify epistemologies as reflecting meaning in the physical concept, describing knowledge as having intrinsic meaning embedded within an object. Della- Porter and Keating, (2008) describe knowledge that has an embedded meaning as being 'objective'.

The epistemology of objectivism acknowledges meaning to be independent of social actors (Crotty, 1998; Bryman and Bell, 2007; Saunders *et al.* 2009) suggesting that individuals discover knowledge when they are physically exposed to a social and physical environment. In other words, within the context of objective research, meaning can only be discovered when respondents are confronted with different scenarios; thus firmly rejecting the notion that knowledge can be constructed and that meaning comes from the engagement of research respondents' minds. On the other hand 'subjective' meaning assumes knowledge cannot be separated from human values (Hirschem, 1985), suggesting knowledge is developed through an understanding of social reality through the lens of actors in the social world (Cunliffe, 2008). In other words, within the context of subjective research both the researchers' and respondents' values underpin world values and are therefore viewed as an integral part of the research process.

In terms of this research, Coast and Horrocks (2007) along with Ryan *et al.* (2008b) describe how there is currently very little theoretical guidance in discovering the attributes needed for a DCE (as discussed in Section 3.6.2).

Indeed, Pitchforth *et al.* (2007) argue that qualitative data can offer a greater insight to designing a quantitative survey, suggesting knowledge of the attributes can be identified through understanding respondents' values. Consequently the epistemology of 'intersubjectivity' maybe adopted. Morgan (2007) describes how knowledge developed 'intersubjectively' allows researchers to believe in the real world by an approach which recognises that all individuals have their own unique interpretations of reality. This is the epistemology underpinning the functional approach to research known as pragmatism in which primary data can be gathered experimentally and mixed method research and meaning is discovered through the analysis of statistical data (Crotty, 1998). The following section provides the context to pragmatism by highlighting some of the criticisms associated with taking a purely 'objective' and positivist perspective.

4.1.1 Theoretical underpinning

First developed in the 16th Century, positivism follows a similar meaning to that found in positive religion and positive law (Crotty, 1998). This identifies truth to originate from the nature of *things* and refuses to accept that knowledge can be constructed subjectively (Crotty, 1998). In fact, according to the philosopher Galileo, primary attributes are those that are posited and can only be measured or quantified. This view argues that meaning can only be discovered for all attributes that are scientifically measurable, meaning positivist knowledge to be more often constructed numerically. In science, the term positivism was first used by Auguste Comte in the 19th Century. In a detailed review of Comte's work, Simpson (1982, p. 69) states: *"It cannot too often be stressed that he means an attitude of mind towards science and the explanation of man, nature, and society, and not some predilection for mathematical precision",* suggesting that positivism is concerned with the state of the mind rather than simply numerical accuracy. In the light of this view, Comte's notion of positivism proves that when conducting research, people should base their approach on laws that are scientifically

established and methods that allow truth to be observed, experimented on and compared (Crotty, 1998). This acknowledges the fundamental concept of positivism to be similar to that found in other physical sciences, (May and Williams, 1996). Knowledge is not arrived at speculatively but is grounded firmly and exclusively in something that is given (Crotty, 1998; Della Porta and Keating, 2008). This identifies social actors as discovering knowledge through direct experiences rather than through simple speculation.

Although a number of variations of positivism have been developed since Comte's seminal contributions in the 19th Century, including logical and post positivism, Comte's notion of positivism has proved to be the only approach to discovering scientific knowledge that is both accurate and certain (Crotty, 1998). However, it is important to note that Comte argued that no social fact could have any scientific meaning until it is connected with some other social fact and without that social fact, knowledge remains a narrative involving no rational utility (cited by Crotty, 1998 as Simpson, 1982, p. 82). In this research, the need to investigate causality when analysing consumer choice would allow meaning to be discovered. However as previously explained eliciting knowledge objectively through the theory of positivism has a number of limitations that restrict knowledge being discovered.

The main criticism of accepting a positivist epistemology for this research project concerns the representation of the results. From a purely positivist perspective the attributes used in this study should provide a reliable representation of the attributes for the entire student population (Anderson *et al.* 2003; Freeman, 2011). Reliability tests, such as Cronback's Alpha could be used to discover the degree of generalisbility associated with the data (Moore, 2011). Nevertheless, as discussed later on in this Section, Lancsar and Louviere (2008) describe how the data from DCE's cannot be generalised. This is because the data collected through experimental conditions only provides an insight into the population who

take part in the study, meaning, less scientific techniques need to be used when evaluating the attributes and levels. Furthermore, Louviere *et al.* (2000) stresses the importance of examining the joint significance of the attributes incorporated within Lancaster's framework (as discussed in Section 3.6.6) as often the attributes are not viewed objectively when analysing DCE data. Consequently when discovering the attributes and levels for this study guidance was taken from the extant DCE literature (Coast, 1999; Louviere, 2000; Pitchforth *et al.* 2007 – a more detailed review of the procuderes used to identify the attributes and levels is found in Section 4.2.1) that recommends the use of qualitative techniques, thereby incorporating subjective knowledge. Moreover this allowed meaning about the attributes and levels to be identified (a more detailed explanation of the attributes and levels incorporated for this study are presented in Chapter 5). In this study, data on the attributes associated with this type of course are quantified for the purpose of developing meaning about students' reservation price. Therefore, this research adopts a pragmatic approach, discovering knowledge.

First developed in the 1860's by Charles Pierce and John Dewey pragmatism is considered as an alternative to abstract and rationalistic science (Murphy, 1990; Cherryholmes, 1992; Rocco *et al.* 2003). Goldkuhl (2004) describes how the fundamentals of pragmatism concern 'what works best' in a research environment, therefore placing less emphasis on understanding the total truth and instead focusing on the allocation of resources that will deliver the best results. Tashakkori and Cresswell (2007) agree, arguing that pragmatism provides a realistic approach to undertaking social science research. However, despite these favourable features of pragmatism, it still remains considered a less valid research paradigm than 'objective' or 'subjective' epistemologies. In fact, Healy and Perry (2000) conducted a critical review into the different approaches to discovering knowledge. The purpose of this research was to highlight the main epistemologies underpinning social research. On the whole, the findings from this

study reported overwhelming support for only four paradigms, namely; positivism, critical theory, constructivism and realism, implying pragmatism not to be considered as a popular approach to eliciting knowledge. However, Bryman and Bell (2007) reject this view, arguing that pragmatism is primarily driven by a study's research question (as outlined in Section 1.4) and therefore provides an extremely flexible and thorough approach to conducting modern day research. Lancsar and Louviere (2008) agree, describing how DCE research cannot be achieved using a purely 'objective' or 'subjective' epistemological approach. Therefore, this research adopts a pragmatic approach, discovering qualitative and quantitative knowledge as part of an experiment.

4.1.2 Research methodology

Rooted in social science research, methodology recognises the instruments needed to acquire knowledge (Della Porta and Keating, 2008). Crotty, (1998) argues that when presenting a methodology, it is important not only to provide a description of the strategy but also to provide clear explanation of the rationale and how it fits into the entire research project. In other words, the research methodology should be developed in line with the focus of the investigation (Malhotra, 2004). This demonstrates that the methodology selected for this project should, first, encourage the discovery of pragmatic knowledge in a highly logical and organised manner that can allow a set of finite product attributes to be tested to see how they influence consumer preference. Second, the research methodology should allow student preference to be determined in a highly controlled environment in order to avoid the threat of bias. Again, this rejects any methodological instruments that assume knowledge is constructed totally subjectively through the development of ethnography or case study methodologies.

In the light of the pragmatic approach underpinning this work, experimental research methodologies provide a well defined and suitable approach to identifying causal links between a finite set of product attributes in order to answer the underlying researchable question, (as outlined in Section 1.4) (Louviere and Hensher, 1982; Holdsworth and Nind, 2005; Louviere *et al.* 2000). An experiment is where one or more independent variables are manipulated to measure their effect on the dependent variable (Malhotra, 2004). It can be recognised that experiments provide an insight into the relationship between product attributes, providing a well cited approach to understanding consumer decision making (Louviere and Woodworth, 1983; Green and Srinivasin, 1990; Carson *et al.* 1994; Louviere and Meyer, 2008; Street, Burgess and Louviere, 2005). As discussed in Chapter 3 the focus of this research project is towards developing a DCE. Gerard, Ryan and Amaya-Amaya (2008, p. 4) explain how: *"DCEs are an attribute-based approach to collect SP data. They involve presenting respondents with a sequence of hypothetical scenarios (choice sets) composed by two or more competing alternatives that vary along several attributes, one of which may be price of the alternative or some approximation for it. In a Lancasterian framework (Lancaster, 1966), it is assumed these attributes levels determine the value (utility) of each alternative"*. In other words DCEs provide a highly structured and pragmatic methodology for investigating data that allows the relationship between a finite set of attributes to be examined without the threat of bias.

One of the most important advantages associated with experimental research such as DCEs is that it allows the change between two or more variables to be measured, providing policymakers with a clear insight into the utility associated with different product features (May and Williams, 1996). Other benefits often associated with DCEs concern the high degree of internal validity that can be achieved through controlling the experiment environment, reducing the risk of

bias. Although DCEs are popular within consumer research, care has to be taken when recruiting respondents, ensuring that they are capable of answering the research questions (Malhotra, 2004). Furthermore, DCEs can also involve much planning and preparation suggesting experiments have to be highly organised and planned (Saunders *et al.* 2009). However, despite there being a number of issues associated with DCE methodologies, Lancsar and Louviere (2008) argue that a deeper understanding about consumer choice cannot be discovered using a purely scientific approach. Accordingly, the only methodological strategy cited by Bryman and Bell (2007) that acknowledges the allocation of the most suitable resources are experiments, proving pragmatism to underpin experimental research.

In the light of this view, the marketing literature identifies interviews and surveys as common methods associated with experimental strategies in discovering statistical information (Punj and Staelin, 1978; Reibstein, 1978; Batsell, 1980). The benefits associated with using interviews and surveys as methods of obtaining data as part of a DCE are outlined in the following section.

4.1.3 Methods

In pragmatic research, methods of data collection can be viewed as obtaining qualitative and statistical data through an intersubjective process (Cochran, 1977; Crotty, 1998). Results are more commonly represented quantitatively and can often investigate a number of predetermined variables in a highly controlled environment, such as an experiment (Bryman and Bell, 2007). This allows causal relationships between the independent variables to be examined explaining the results of the dependent variable (Della and Porta, 2008).

The most commonly cited approaches to collecting qualitative and statistical data are through interviews and through quantitative surveys. In this research, surveys can be described as providing a structured approach to extracting quantitative results. The aim is to construct a survey that will allow monetary values to be

ascribed to the product attributes that make up a degree course. The product attributes that influence student choice have already been reviewed in Section 3.1.2, suggesting that little research to date has examined the attributes that influence choice of course. In the light of this, the attributes incorporated within this survey are taken from the student choice literature before being verified along with determining their associated levels using focus group and face to face interviews (as shown in Stage 1 in Figure 4.1). The findings from these interviews are documented in Chapter 5 and will be used to construct the survey instrument. Finally, the findings from the survey (as shown in Stages 2-5 in Figure 4.1) will be used to inform academics about the attributes that impact student choice in Chapter 6.

This section has presented information on the components that make up the research structure, acknowledging this study to take a pragmatic approach to answering the underlying researchable question (as presented in Section 1.4). As discussed in Section 3.6 constructing a DCE incorporates 5 different stages. These are presented in chronological order in the following section and further shown diagrammatically in Figure 4.1.

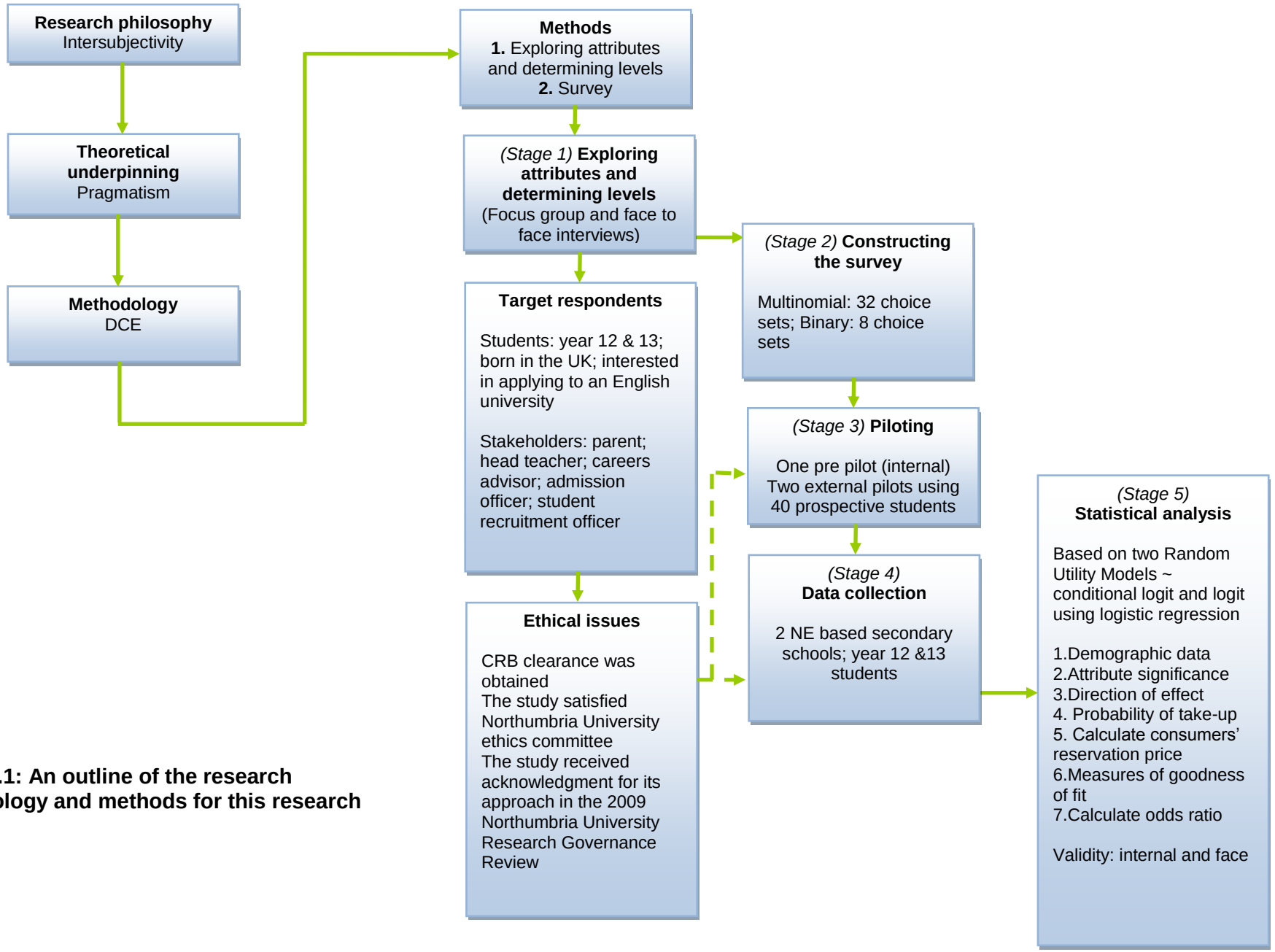


Figure 4.1: An outline of the research methodology and methods for this research project

4.2 Part (ii): Developing a DCE study (the approach adopted for this study)

4.2.1 Stage 1~ validating the product attributes and determining the levels

As previously discussed in Section 3.1, product attributes underpin a consumer behaviour approach to how students make a decision about choosing a full-time undergraduate degree course. Although a thorough inspection of the extant research in this field reveals the possibility of nine attributes having an influence on course level decision making, at this point in time, this is not confirmed by the literature and the levels associated with these attributes remain unknown. In this case, research into the attributes that influence consumer choices in neighbouring fields such as transport and health economics have more recently drawn upon cross disciplinary modes of validating attributes when developing DCE research (Coast, 1999; Hensher and Button, 2000; Salkeld, Ryan and Short, 2000; Bech, 2003; Hensher, 2008 and Lancsar and Louviere, 2008). The main outcome of this shift is the incorporation of qualitative research. More commonly, focus group and semi-structured interview methods are used (Louviere, 2000; Pitchforth *et al.* 2007 and Coast and Horrocks, 2007). Coast (1999) argue how such methods are generally conducted within a constructivist paradigm, suggesting that meaning can be discovered through different participants sharing their own ideas. Nevertheless, the incorporation of qualitative research is not contained within use of a constructivist approach of research (Coast, 1999). Lincoln (1992) along with Carter and Curry (2010) argue how qualitative research can be used within conventional positivist scientific research. Coast (1999, p.350) agrees, stating: *"In identifying preferences, qualitative methods may be appropriately used in a number of ways. Without necessarily taking a constructivist view of the world methods such as semi-structured interviews or focus groups can be used to talk to individuals and identify themes relating to their preferences".*

Therefore attributes were generated over a three month period (December 2008 – February 2009) through a series of four focus groups and five face to face interviews. Bloor, Frankland, Thomas and Robson (2001) describe focus groups as a number of organised discussions that provide an insight into meanings, expose processes and challenge normative thinking. Krueger and Casey (2001) argue that when working with young people a group presence can encourage conversation, a view further supported by Coast and Horrocks (2007), who believe a focus group method can be cost effective in exploring prominent factors and drawing out core themes within a group of research respondents. For this Doctorial investigation it was decided that focus groups would enable the collection of data, minimising the threat of subjective influence (Robson, 2002). Furthermore, the environment provided by focus groups would stimulate discussion amongst research participants, thus encouraging communication. Krueger and Casey (2009) believe the aims and objectives of organising a focus group should be clearly defined. Figure 4.2 provides detail of the specific aims and objectives underpinning this specific investigation.

Focus Group Aims:

- To investigate whether the attributes identified from the literature influences prospective students' choice of course
- To provide insight into the values associated with different decision making attributes
- To work with a broad range of prospective students from different social economic backgrounds (Ball, Davies, David and Reay, 2002 and Moogan, 2011)

Focus Group Objectives:

- To discuss the different type of courses that the prospective students were interested in studying in order to provide an ice breaker to the investigation
- To discuss the attributes that prospective students consider influence their choice of degree course
- To uncover the hypothetical economic valuations placed on a set of specific decision making attributes
- To uncover a price proxy of attributes which impact decisions to attend university

Figure 4.2: Overall aims and objectives attributed to undertaking focus groups

However, focus groups are far from uniform and can take a number of forms (Greenbaum, 1998). In acknowledging the very individual nature of focus group research, Kent (2007) outlines six types of focus group: 'Standard groups, Mini-groups, Extended groups, Reconvened groups, Sensitivity panels and finally Creativity groups', although evidence from previous DCEs shows the use of both standard and mini focus groups (Holdsworth and Nind, 2005). However, Kent (2007) states that standard focus groups are very often used at addressing more general research topics. Therefore for the purpose of this study mini-groups were used. Burns and Bush (2010) describe how this is because mini focus groups incorporating between 4 and 6 people are better suited to eliciting information about specific issues on a variety of levels.

There are clearly a number of benefits to undertaking mini-groups focus groups. Morgan (1998) identifies mini-groups focus groups as providing the opportunity to receive a greater insight into understanding areas that may be sensitive in nature, further providing an understanding of why people behave. Mini focus groups also provide a more relaxed environment that allows participants to feel at ease (Saunders *et al.* 2009). However, Langford and McDonagh (2003) do offer some concern when conducting mini-groups focus groups, arguing that when incorporating multiple research, participants' mini-groups focus groups can lose the thread of the debate, further sacrificing the quality of the discussion. The authors go on to describe the threat dominant individual participants may have on deterring other participants from contributing. However, despite these limitations Lancsar and Louviere (2008) believe that focus groups that are administered correctly can provide rich theoretical data that can further facilitate the design of future research.

Each focus group took place in a North-East based secondary school. Secondary schools were limited to those based in the Newcastle (further detail on the schools based in the Tyne Tees area is found in Appendix C) area due to the resources available for the study. In order to avoid the threat of post rationalisation, secondary school students were targeted (Holdsworth and Nind, 2005). The four focus groups provided an opportunity to investigate the product attributes. Three of the four schools were state run (providing free admission); the fourth was independent (charged students tuition) with all four schools being of no specific faith (e.g. Roman Catholic). School **B** was the only school which incorporated research participants who were receiving help from the Government in terms of Widening Participation strategy. This Government policy aims to generate awareness for HE amongst prospective students from lower income families, ethnic minorities or students whose parents may be disabled (HEFC, 2009). As a form of validity, respondents were asked to provide their postcode

when signing the informed consent forms, to ensure they were classed as WP students. This was later cross referenced against the 2008 WP Government data base for accuracy. The voluntary respondents were between 17 and 18 years old and were selected by the Heads of Sixth Form. Respondents were chosen on the basis that they were interested in going to an English university to enrol on a full-time degree (rather than seeking employment after year 13) and secondly that they had no previous experience of attending university as a full-time student. Furthermore, a deliberate attempt was made with the Head of Sixth Form to recruit an equal number of male and female respondents. However, this was dependent upon student availability.

A meeting was organised in advance with all four of the schools in order to clarify any concerns held by the Head of Sixth Form. This also provided the opportunity to deliver the appropriate ethics forms which required parental signatures before collecting any primary data (See Section 4.4 for detail on the different ethical considerations). Each focus group was divided into two parts. This included one forty minute and one twenty minute session. Krueger and Casey (2001) believe that it is important to provide an ice breaker when meeting respondents for the first time. This gave the students time to relax and for the group to feel at ease (Kent, 2007). The respondents were then informed that throughout the session they would be thinking about what factors influence their choice of degree course. The respondents were then given the opportunity to ask any questions before beginning the session. Respondents in all four schools appeared to understand the task and that they were only considering the factors that influence choice of course rather than choice of university.

The nine preliminary product attributes as shown in alphabetical order in Figure 3.11 (entry requirements, facilities, graduate employment, location, cost of fees, quality of teaching, reputation, safety and type of course) were distributed amongst respondents as the first part of the discussion of the focus group. The

respondents were asked to read through the nine cards and familiarise themselves with the different product attributes. It is important to note that the respondents were encouraged to voice their own thoughts about each product attribute and that there were no right or wrong answers. The respondents were not asked to rank the different product attributes, only to discuss the characteristics associated with each attribute.

Once the nine attributes had been discussed the respondents were then asked to consider the levels (or values) associated with each attribute. At this point it was important to reassure respondents that again there was no right or wrong answer when ascribing levels. For example, respondents were asked to consider what they felt about distance from home and how much they would individually be willing to travel for their choice of degree course. The respondents were again encouraged to speak freely in order to avoid receiving a collective value. It felt important to outline this in order to avoid any of the respondents refusing to take part in the exercise (Arksey and Knight, 1999). The respondents were then asked to consider how much they would be willing to pay for a degree course that contains all of the best values contained within the nine product attributes. This encouraged the respondents to provide a maximum price when choosing an undergraduate degree course. At the end of the discussion, the range and method of payment were tested to see whether prospective respondents felt cost expressed in pounds was an appropriate representation when ascribing value to full-time undergraduate degree courses. This further acknowledged cost in pounds to represent an appropriate payment vehicle (as described in Section 3.4.3) instead of paying through the equivalent of a graduate tax.

Following the interviews with Student respondents, a group of other stakeholders (as defined in Section 2.2.1) were then interviewed. McClung and Werner (2008, p. 103) describe students as not being the only respondents involved in the decision making process, stating: *“every university has recognised the need to*

satisfy a variety of what are now called 'stakeholders", suggesting more than students are involved in the initial decision making process. Arksey and Knight (1999) believe face-to-face interviews allow the opportunity to examine relationships between the research participant and the characteristics of a situation, providing greater insight into the context surrounding the research question. Furthermore LeCompte *et al.* (1992) acknowledge the benefits of conducting interviews within HE, believing they can be exceedingly rewarding in developing a theoretical investigation.

The stakeholders' group comprised five respondents who were recruited independently and had no previous knowledge of the study. Respondent characteristics were identified from the student choice literature acknowledging them to have an influence on and interest in the decision making process. Respondents included an 'Admissions Officer (Murphy, 1981 and Litten and Brodigan, 1982), a Parent (mother) (Kandel and Lesser, 1969, Dahl, 1982 and Hearn, 1984; Foskett and Hemsley-Brown, 2001); Student Recruitment Officer (Hossler and Hu, 2000), HE Careers Advisor (Moogan *et al.* 1999; Litten and Brodigan, 1982; Hayes, 1989; Hossler and Gallagher, 1987; James *et al.* 1999; McClung and Werner, 2008) and a Head Teacher (Great Britain. Institute For Employment Studies, 1999; Maringe, 2006 and Foskett *et al.* 2006). Despite interest from all five respondents about attending a focus group, arranging a date convenient with all parties proved difficult. After a number of unsuccessful attempts it was decided to conduct individual face-to-face interviews. The format of the interview followed that of the focus group and was separated into two sections. Each of the focus group and face-to-face interviews were digitally recorded and later transcribed.

In order to ensure that the attributes developed from the pilot study could be statistically analysed, the attributes and levels were validated in each of the focus groups. Nine attributes were identified from School **A** to impact student choice.

Before presenting School **B, C and D** respondents with the nine attributes, the students were encouraged to think about and discuss any attributes that impact course choice, further acknowledging the objective and epistemological focus of the thesis. Although Schools **A**, **B, C and D** were also asked to discuss the same nine attributes, all respondents were strongly encouraged to consider any other attributes that were not already mentioned. This provided an opportunity to validate the attributes to ensure only the main attributes were incorporated within the study.

When analysing the data from the pilot interviews great care was taken to ensure that it followed the epistemological nature of the study. Data was analysed following Miles and Huberman's (1994) model of data analysis (as shown in Appendix D). Despite its age, this model follows a highly structured approach to breaking down primary data, an ideology that Crotty (1998) considers essential when preparing to take a pragmatic approach to research. The first stage in the model involved reducing data by visually transforming the appearance of the data collected. This was achieved by using dedicated computer software NVivo 8. One major benefit of using NVivo is that it can provide a secure base to store confidential data (Bazeley, 2007), providing rigour to the research investigation. The first step in this preliminary model was first to break down the data according to each section of the focus group and face-to face interviews. This involved examining each interview transcript individually. In total eleven, headings were constructed, nine for the individual attributes and a further two for catching general information. For each heading, the individual attributes were examined to find themes, allowing core values to be identified. A screen print for this stage is presented in Appendix (E).

Following the reduction of the primary data, Miles and Huberman, (1994) argue the focus should turn towards data display. For the second stage of the model, data display concerns the compressed assembly of primary data. This provides a

visual breakdown of the information, providing easy access to interpreting the results. Initial coding was performed to sort the data into broad themes. Miles and Huberman (1994) describe, when drawing themes from qualitative data, that the 'Noting, Patterns and Themes' approach provides a highly structured approach to discovering themes between a set of respondents. This is shown visually in Appendix (F). The analysis concluded by drawing conclusions from the data. This allowed levels for each attribute to be discovered. Hartmann and Sattler (2002) argue that fewer than 75% of DCE incorporate 6 or fewer attributes, implying the need to keep the DCE manageable. Interestingly Ryan *et al.* (2008a) supports this view, believing a study incorporating more than 6 attributes should be reduced. See Chapter 5 for detail and the outcomes on validating the attributes and levels.

Finally, a breakdown of the respondents' characteristics is provided in Table 4.1 and Table 4.2. Table 4.1 contains details concerning the status of the school with Table 4.2 outlining the stakeholder respondents labelled one to five.

Respondents N (28)		**School**	**Status**
Male n=4	Female n=2	School **A**	Middle ground
Male n=1	Female n=7	School **B**	Widening participation
Male n=5	Female n=4	School **C**	Fee paying
Male n=4	Female n=1	School **D**	Middle ground

Table 4.1: School Respondent Breakdown

Respondents N (5)	**Gender**	**Status**
One	Female	Admission officer
Two	Female	Parent
Three	Female	Student recruitment officer
Four	Female	HE careers advisor
Five	Male	Head teacher

Table 4.2: Stakeholder Respondent Breakdown

4.2.2 Stage 2 ~ constructing the survey

Amaya-Amaya *et al.* (2008) describe that aside from identifying the right number of attributes and levels, it is important to consider strategies for maximising the amount and quality of information obtained from the respondents. One issue that is commonly discussed within the DCE literature is the decision to include an opt-out question (Lancsar and Louviere, 2008). Amaya-Amaya *et al.* (2008) believe this decision is subject specific and should be guided by whether or not an opt-out question is considered realistic. In the past opt-out questions for prospective students have been preferred, as choosing to enrol into university is not mandatory (Holdsworth and Nind, 2005), suggesting failure to include an opt-out would have resulted in student choices being overestimated. Indeed, a review of DCE research in other disciplines suggests there is growing acceptance for incorporating opt-out questions. Amaya-Amaya *et al.* (2008, p. 21) discuss: *"for example within the context of health care, individuals may prefer not to take up certain drugs, interventions or screening programmes, regardless of the level of attributes of the service. Alternatively, they may choose to participate only for certain levels of attributes of the alternatives"*, implying there is an element of flexibility within the designs. The two most typical approaches to obtaining choice scenarios are through multinomial and binary (dichotomous) designs. Multinomial designs allow respondents to select one of three choices where one option is more commonly classed as an opt-out (Louviere *et al.* 2000), where binary designs offer only two choice options (Street and Burgess, 2007). Within this study multinomial and binary designs were used. This was because outcomes taken from the analysis of the pre DCE (as discussed in Section 4.2.1) study could not be ignored and that the attribute 'facilities' revealed equal preference for both the quality and price of university accommodation.

Huber and Zwerina (1996) outline four criteria to consider when constructing a survey; namely, orthogonality, level balance, utility balance and minimal overlap. However, obtaining a balance between the different criteria is a matter of

judgment since improving some of the criteria can come at the expense of others (McIntosh, 2003). The main criteria adhered to in this study were orthogonality, level balance and minimal overlap. These are shown in Figure 4.3.

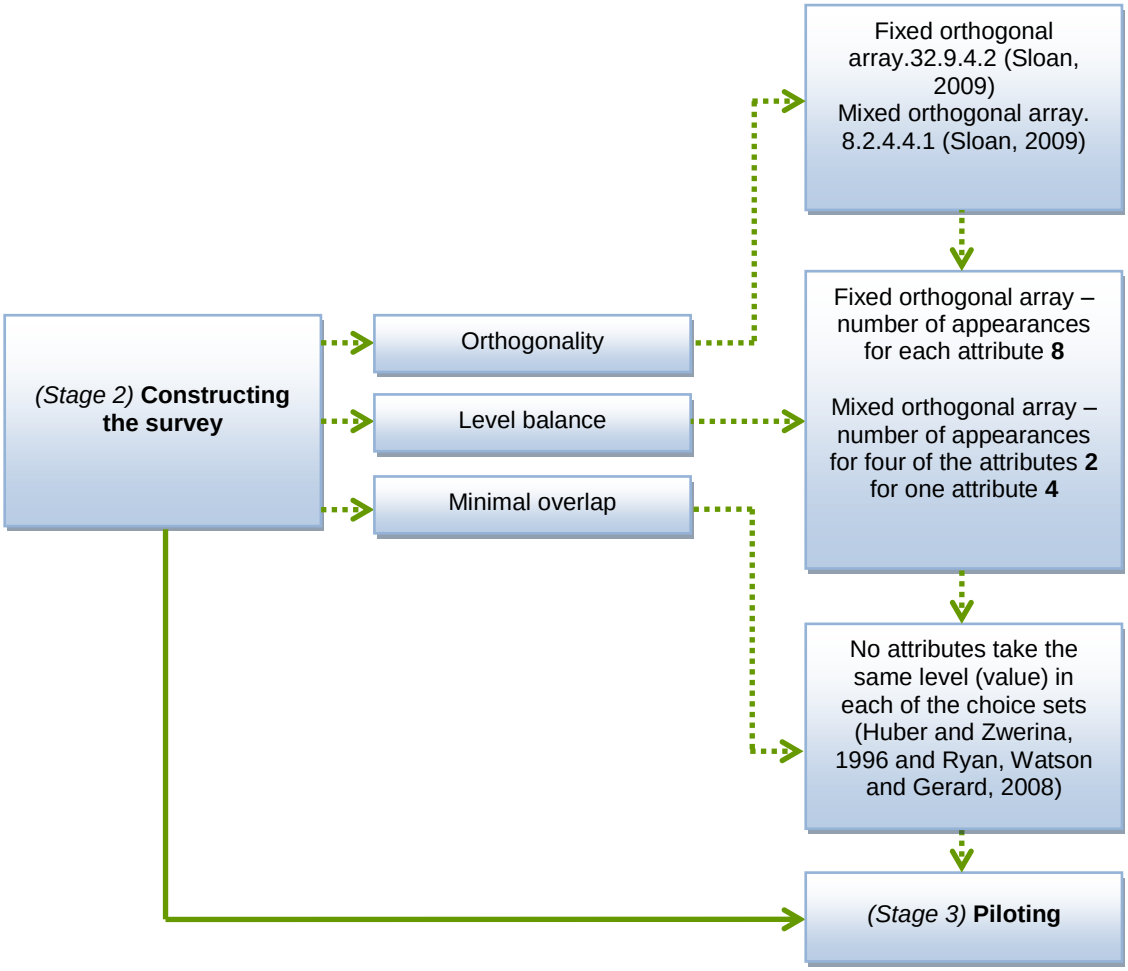


Figure 4.3: The design criteria adhered to for this research project

As previously discussed in Chapter 3 orthogonality is assumed when there is a linear relationship between all attributes with no one attribute having a dominant position within the design. Nevertheless, Louviere *et al.* (2000) argue how developments in orthogonal experimental design theory for non-linear models are still in their infancy. Therefore orthogonal experimental designs were constructed using orthogonal arrays taken from Neil Sloan's website (Sloan, 2009). This was to ensure the most up to date experimental design was used. Street, Burgess and Louviere (2005) recommend when sourcing orthogonal arrays for a DCE to select a design that exceeds the researcher's design requirements. The first

orthogonal array taken from Sloan's (2009) web catalogue was a fixed design and included a fractional factorial design (as discussed in Section 3.6.4) with 32 choice sets, 9 attributes each at 4 levels. A fixed orthogonal array can be described as a design which has an equal amount of attributes and levels (Louviere *et al.* 2000). Although designed originally to be capable of measuring up to nine attributes, only six of the columns were used. In fact the removal of columns is proven to be an effective approach to reducing the size of a design without compromising orthogonality (Hensher *et al.* 2005; Hensher *et al.* 2005; Street *et al.* 2005 and Burgess and Street, 2007). This is reported in Appendix (G) highlighting in red the three columns rejected for this experiment. Following the removal of three columns the data was then converted using the levels identified in Figure 5.3 ascribing values to the individual choice sets. Following this, the design was then tested for level balance acknowledging an equal number of levels to be assigned with each of the product attributes. This is recognised in Appendix (H) disregarding any threat of bias through an unequal number of levels (Huber and Zwerina, 1996). The checks concluded by testing for minimal overlap. Minimal overlap was assessed by checking that no attributes had the same level within a choice set.

Once the appropriate tests had been completed, the choice sets were constructed without assistance from computer software, an approach that is strongly supported by DCE co-founder Professor Jordan Louviere. In fact, a review of the extant published research into constructing 'optimal' and 'nearly optimal' choice sets has increased steadily since the late 1990s (Louviere *et al.* 2000; Street, Bunch and Moore, 2001; Street and Burgess, 2004; Street and Burgess, 2007), with one of the most commonly referred to articles published by Street *et al.* (2005). Writing in the *International Journal of Research in Marketing* the writers outline six different methods that are available to construct choice sets, going onto discover that the L^{MA} (L = level, M = alternative and A = attribute)

method is the most flexible technique to generate routinely designs for main effect plans. Therefore the L^{MA} method was incorporated into this research project. The L^{MA} method can be described as adding one to each of the attributes in the design in order to create a second pair of choice sets. For each combination of levels, the first six attributes were used to represent the first alternative (Course A) in the choice set with the final six attributes being used to create the second alternative (Course B) in the choice set. In order to create the second alternative, each level was increased by 1 number in each choice set. For example 0 became 1; 1 became 2; 2 became 3 and 3 became 0 Burgess and Street, 2007). As the design is large, detail of this procedure is shown in Appendix (I) before individual level labels were then ascribed and presented in Appendix (J).

For the binary design a mixed orthogonal array was taken from Neil Sloan's website (Sloan, 2009). A mixed orthogonal array can be described including attributes with a different number of levels Ryan *et al.* (2008b). The fractional factorial design contained 8 choice sets, 4 attributes with 2 levels and 1 attribute with 4 levels and is represented in Appendix (K). Again the three properties of orthogonality, level balance and minimum overlap were tested (Huber and Zwerina, 1996). Results from these tests showed no correlation between the attributes; each attribute contained an equal number of level values (which are further shown in Appendix (L) and lastly none of the attributes have the same levels with a choice set. At this point, the choice sets were constructed manually in line with Street and Burgess's (2007) technique by increasing each level by 1 to allow the individual choice sets to be created. The results are reported in Appendix (M). Finally the binary design was also generically labelled with a degree of freedom of 6 (A+1 or 5 attributes + 1=6), leaving 2 degrees of freedom to estimate error terms at the individual level. The exercise finished by

randomising the choice sets although once randomised, the ordering of the choice sets remained the same through the investigation.

The task of constructing the survey instrument then moved on to designing the layout and overall presentation of the survey. Each survey contained a title page explaining to the respondents that the data was being collected as part of a postgraduate research project and would have no impact on their actual choice of degree course. The approximate time to complete the study was also provided, acknowledging the approximate length of completion. The second page included a set of instructions. These provided detail of the structure of the survey, highlighting the different sections of the survey. A key was also provided to define the different meaning of the attribute 'quality of accommodation', thus giving additional information to reduce the risk of ambiguity (Hensher *et al.* 2005). It was also considered important that an example question was also included to provide contextual information to the respondents (Hensher *et al.* 2005). The construction of the survey instrument finished with the survey being printed on an A3 size before being folded in half to form A4 booklets, allowing the document to be easily digested (Dillman, 2000). (See Appendix N for a copy of the final survey).

4.2.3 Stage 3~ piloting the survey design

In nearly all DCE studies a pilot study is used to test how target respondents react to a survey instrument (Wagner, Hu, Dueńas and Pasick 2000; Louviere 2006; De Bekker-Grob *et al.* 2010). One of the most important benefits of piloting is that it can ensure that respondents confirm that the right attributes and levels are included within a DCE study, providing theoretical reassurance for a finite set of variables. As discussed in Chapter 3 the extant research into developing DCEs place great emphasis on the piloting process, with Hensher *et al.* (2005, p. 165-166) stating: *"it is best to spend time revising now than to find out later that you cannot answer your research problem after you have collected all of your data"*.

Piloting for the survey was conducted through a series of three pilot sessions. This is illustrated in Figure 4.4.

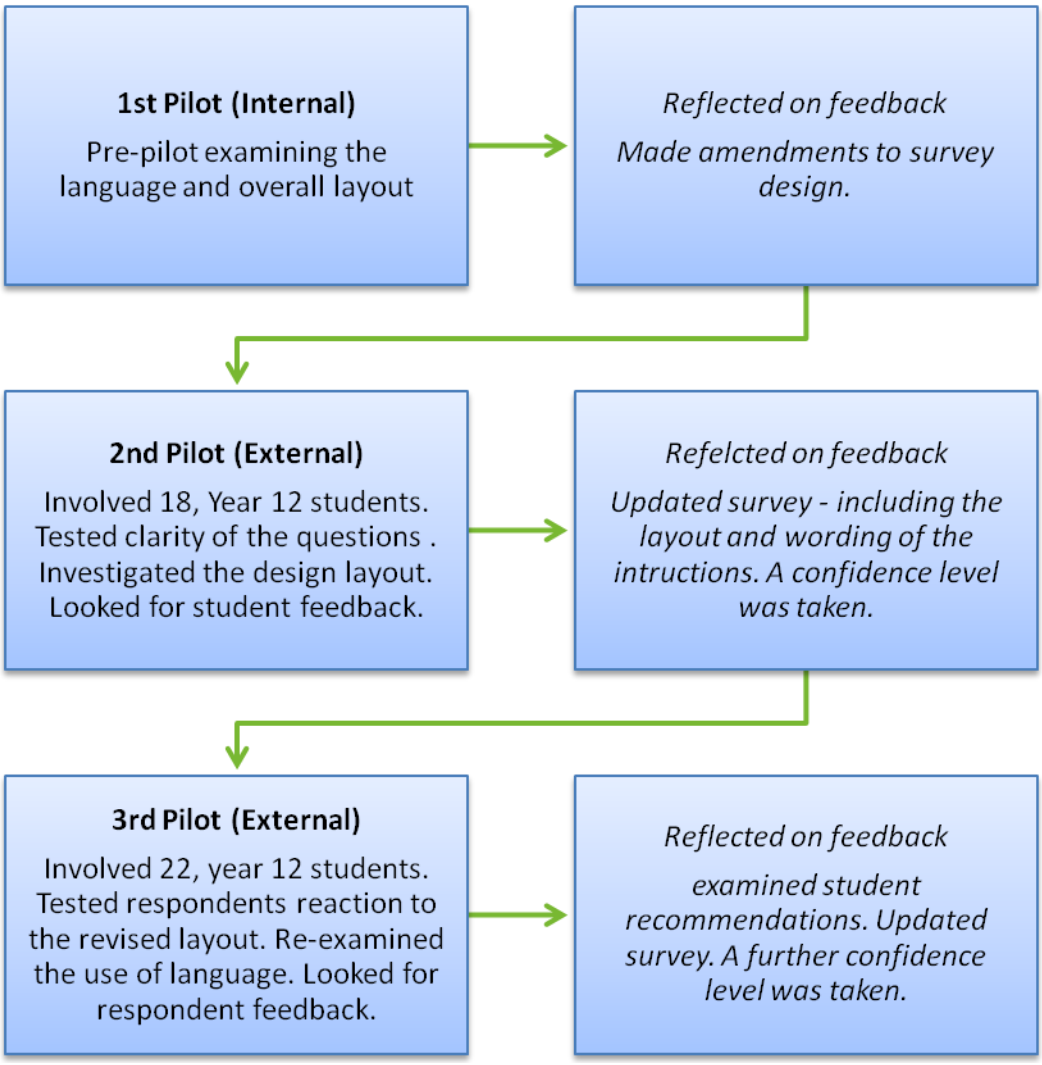


Figure 4.4: Piloting the self-administered survey

Each session began with a short introduction outlining the purpose of the survey. This also provided the opportunity to encourage the respondents to talk openly about any feelings they had about the survey. Following the introduction, the surveys were given out and the respondents' behaviour was observed. A general summary of these observations is found in Appendix (O). However, it was felt important to monitor closely how long the respondents took to complete the survey (Louviere, 2000 and Hensher *et al.* 2005). In an investigation examining the length of DCEs, Hartmann and Sattler (2002) reported that the average time

taken should be no more than 14minutes, any more would have a negative impact on the response rate. Preliminary analysis of the students revealed respondents to take between 9 and 14 minutes to complete, satisfying the parameters suggested by Hartmann and Sattler (2002). Following the completion of the survey a short group discussion was initiated in order to understand better the views of the respondents. First, they were asked to talk about the structure of the survey. This revealed several issues with the layout and wording of the document. The discussion then moved on to discuss the different product attributes and their levels, revealing no concerns. The discussion finished with respondents given the opportunity to make any comments or recommendations concerning the survey. The outcome was that the respondents appeared to have a good understanding of the product attributes associated with choice of course, rejecting the need for an 'information accelerator', which Lancsar and Louviere (2008) describe as only necessary when respondents have little knowledge of the product.

Forty respondents took part in the pilot. Of these, 39 completed all 32 choices leaving only one respondent who had partly completed the survey. Closer inspection revealed the partially completed survey had completed 31 out of the 32 choices implying the length of the survey probably didn't contribute to the respondent not completing all 32 choices. Attention then focused on measuring the level of difficulty associated with completing the survey. This can be evaluated using confidence level tests, which take an average of the aggregate level of difficulty associated with undertaking the survey (results from these tests are found in Appendix P). Initially an average of 50% was recorded. Feedback from the pilot was digested and changes to the layout were made. After this a second external pilot was undertaken. This time, respondents reported an average feedback of 68.2% with the layout of the survey; thus, suggesting that

changes in the design of the document were successful in reducing the level of difficulty associated with the survey.

4.2.4 Stage 4 ~ data collection

The research population is more widely reported as an entire group of people who can fulfil the research objectives, (Burns and Bush, 2006). In other words, the research population is the total number of respondents who could inform the researchable question. In most DCE studies respondents are chosen from a total population based on a set of core characteristics (Louviere *et al.* 2000). Traditionally, investigations examining student choice have targeted Year 12 and 13 students to discover the attributes that influence student choice (Maringe, 2006; Moogan *et al.* 1999; Moogan *et al.* 2001; James *et al.* 1999; Holdsworth and Nind, 2005). Indeed, in the only published DCE used to investigate student choice to date, Holdsworth and Nind, (2005) argue that targeting Year 12 and 13 students can provide valuable information on the attributes that influence student decision making, suggesting Year 12 and 13 students provide rich data about the attributes that influence student choice.

Once the relevant population had been identified, it was felt important to consider the number of respondents within similar studies targeting Year 12 and Year 13 students. However, besides using sixth form students; previous studies have more commonly taken a sample of the student population. This is because it is impossible to know how many students are interested in applying to HE. A sample can be shown as a representative of the total population (Louviere *et al.* 2000). Samples within DCE can either be classed as probabilistic or non-probabilistic (Bateman *et al.* 2002). Non-probability samples are preferred with 3 out of the 4 previous studies incorporating convenience samples to examine student choice in English HE using a survey instrument. The investigation undertaken by Moogan *et al.* (2001) into the trade-off between product attributes when choosing a UK university comprised 22 Year 12 and 13 (69%) females and

10 (31%) males giving a total of 32 respondents. In addition to this, a later study undertaken by Moogan and Baron (2003) examining the characteristics that influence student choice when selecting UK universities comprised 677 Year 12 and 13 students. Finally, Maringe's (2006) investigation into prospective student choice located in Southampton consisted of 201 (52%) female and 186 (48%) male Year 12 and 13 students giving a total of 387 respondents. Although there is only a small number of studies eliciting choice in England, the average number of respondents included within these studies was 362. However, it is important to note that the only other study to date that has taken an experimental methodology and has measured student choice by asking students to form trade-offs between product attributes using a 'pairwise comparison task' (as seen in Figure 3.9) rather than asking them to rank them on a rating scale (Moogan and Baron, 2003 and Maringe, 2006) only managed to secure as few as 32 respondents (Moogan *et al.* 2001). This, therefore, suggests extant experimental research to date has only drawn upon very small sample sizes.

On the other hand, Foskett and Hemsely-Brown (2001) argue future studies exploring student choice should consider undertaking a census. A census can be described as targeting an entire population of a school (Malhotra 2004). The main reason why a census is preferred over probability or non probability sampling techniques is that the findings represent the opinion of an entire population (Burns and Bush, 2010). In other words, no member of the total population is not given the opportunity to undertake the survey. In the light of this, two North-East based secondary schools were targeted to recruit respondents in order to develop a census. A census was chosen as it retrieves information on student preference from the total school population that can be obtained from working within the parameters of a research project (Burns and Bush, 2006).

Respondents were chosen on the basis that they were interested in attending an English university to enrol on a full-time undergraduate degree course. It was felt important to recruit respondents from non fee paying schools who had no

previous experience of paying tuition fees and contained a broad variety of students who had not yet attended university. It was also considered important to involve prospective students from Years 12 and 13 in order to form direct comparisons (Moogan *et al.* 2001; Holdsworth and Nind, 2005).

Responses were collected through a self-administered survey targeting two North-East based secondary schools. A total of 746 surveys were distributed spread across a week in November 2009. It felt important to give each sixth form pupil the opportunity to complete the survey although it would be unlikely that every pupil would be interested in attending an English university. Each school was considered a 'middle ground', containing a large sixth form with respondents receiving free admission. Due to the high student population (746 Year 12 and 13 students) and responses being collected as part of a census, surveys were collected by the researcher or with assistance from the sixth form teaching team. Surveys were collected in the autumn school term in the run up towards the 'Equal Academic Consideration Deadline' administered by UCAS. Any applications submitted after the 15th January are liable to be rejected by English institutions. An introduction was provided at the beginning of the sixth form assembly. Following this introduction, the surveys were given to respondents who expressed a desire to attend an English university. All the respondents appeared to understand the task and were given time during the assembly and during their tutorials to complete the survey. Once the respondents had completed the survey the responses were collected and attention focused on analysing the data.

4.2.5 Stage 5 ~ statistical analysis

This stage can be split into five headings. These are shown in Figure 4.5.

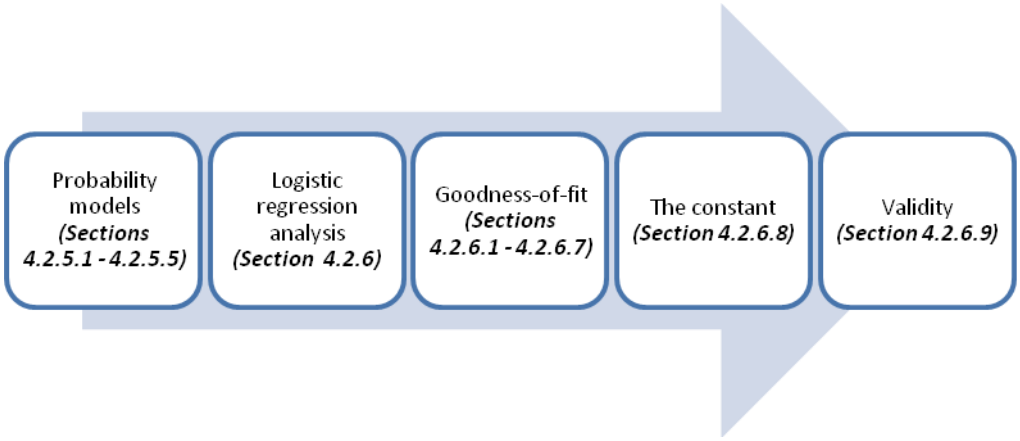


Figure 4.5: The five headings for Stage 5 statistical analysis

4.2.5.1 Probability models

The final stage in developing a DCE study is to undertake statistical analysis. Statistical analysis can be described as a scientific approach to estimating individuals' indirect utility for the alternatives contained within an experiment (Sharma, 1996). Nevertheless, Louviere *et al.* (2000) argue that when analysing choices based on discrete choice theory, part of the consumer utility for an alternative is random and therefore unobservable. Consequently, only the probability that individual (*n*) chooses alternative (*i*) can be estimated. Estimating the indirect utility of an alternative is calculated using probability models (McFadden, 1973; Louviere and Woodworth, 1983; Louviere *et al.* 2000 and Breidert, 2006). Indeed, Louviere (2000, p. 4) argues the inclusion of random utility theory has led to: *"families of probabilistic discrete choice models that describe the behaviour of individual choice probabilities in response to changes in attributes of choice options and/or factors that measure difference in individual choosers".* In a white paper discussing the developments in analysing DCE data, Louviere (2000, p. 4) outlines how the probability that individual (*n*) chooses alternative (*i*) from choice set (C_n) is represented mathematically as shown in equation 1.

(Eq. 1) $\mathbf{P(i|C_n) = P[(X_{in} + \varepsilon_{in}) > Max(X_{in} + \varepsilon_{in})]}$[2]

Section 2.3.1 recalls when working within a random utility theory framework, how (X_{in}) represents the systematic (observable) function for the attributes that make up alternative (*i*) for individual (*n*) and (ε_{in}) contains the proportion that is unobservable therefore random. Equation (1) assumes that the probability of that individual (*n*) chooses alternative (*i*) from choice set C_n is the equal to the probability that the systematic and random components of alternative (*i*) for individual (*n*) are larger than the systematic and random components of all other alternatives that compete with alternative (*i*) (Louviere, 2000). For example, according to equation (1), if an individual is faced with three alternatives and is given the option to pick one, then the probability for that alternative is larger than the systematic and random components assigned to the other two alternatives within the choice set.

It is well documented that selecting a probability model is dependent on the distribution of the random component (εin) (Train, 2003; Hess, 2005; Breidert, 2006 and Street and Burgess, 2007), despite Amaya-Amaya et al. (2008) warning that the distribution can never be truly identified. Much of the extant published research by mathematical psychologists (Thurstone, 1927; Luce, 1959 and Luce, 1977), economists (Marschak, 1960 and Train, McFadden and Goett, 1987) and econometricians (McFadden, 1973; McFadden 1974a; Ai and McFadden 1997 and McFadden and Train 2000) have debated whether the random component that exists within probability models is 'normal' or 'Gumbel' distributed. According to Thurstone (1927) the random components are non-independent and non-identically distributed, meaning the unobserved utility between alternatives has a mean of zero and a variance ($\boldsymbol{\sigma}2$) of 1. This can be

[2] (for all (j) alternatives within choice set C_n)

represented diagrammatically on a normal distribution curve in Appendix Q. Yet, McFadden (1974) rejects the assumption that random variants follow a normal distribution and that they are in fact Gumbel (or independent and identically distributed), meaning the random variants are not distributed symmetrically. Louviere (2000, p. 4) agrees, stating that: *"In Thurstone's case, the normal distributional assumption limited further development of RUT and multiple choice models because the Normal does not have a closed form for more than two choice models"*, suggesting initial research to be more focused on estimating binary data. In fact, the acceptance of the Gumbel distribution has directly led to the wide range of probability models being developed. The mostly commonly applied Gumbel model is the conditional logit (or multinomial logit) model (McFadden 1974a; Batsell, 1980; Currim, 1982; Louviere and Woodworth, 1983; Louviere 2000; Train 2003, and Hensher *et al.* 2005). Long and Freese (2007) describe how the conditional logit model has become the workhorse amongst probability models when analysing multinomial data, suggesting the model to be a popular choice amongst DCE researchers. For example within health economics the rise in DCE research has led to the increase in the application of the conditional logit model. Amaya-Amaya *et al.* (2008) suggest this is due to the rising number of health care decisions that offer more than simply two alternatives (Alternative A: to receive treatment on the NHS; Alternative B: to receive treatment through a private health care provider; Alternative C: don't receive treatment). Similarly, in marketing a large portion of research using conditional logit models has been concerned with examining consumer choices between multinomial choices (Punj and Staelin, 1978; Batsell and Lodish, 1981; Huber, 1982, Louviere and Woodworth, 1983 and Holdsworth and Nind, 2005). Indeed, writing in the *Journal of Marketing Science*, McFadden (1986) acknowledges the benefits of using such a technique in the marketing field, reporting the growing popularity of the conditional logit model in social science and management literature.

4.2.5.2 The conditional logit model

As previously discussed the random component in the conditional logit model can be described as being Gumbel distributed (Train, 2003). The underlying principles for the model are shown in equation 2 and are based on the same terms as previously defined in Section 2.3.1.

(Eq. 2) $$P_{in}=\exp(\mu V_{in})/\sum_{J \in C_n} \exp(\mu V_{in})$$

where (i)=(1, 2, 3...j) represents the set of available alternatives. Each alternative is indexed 1 to j, where (p) is the probability that individual (*n*) when presented with this will choose alternative (i) (McFadden, 1986). The scale values are recognised through the (V's) which describe the desirability (utility) of the alternative. Indeed, these scale values are functions of the attributes of alternatives interacting with the characteristics of individual (*n*). However Breidert (2006) argues that (v) denotes the unobservable portion of utility of the population. Moreover the unknown parameters for (V_{jn}) for alternatives (j) $\in$ (C_n) are typically calculated using the maximum likelihood technique, which measures the random values between the set of attributes contained within a model.

One of the major advantages associated with using the conditional logit model is how it can be used to interpret multinomial data. The conditional logit model allows the significance of attributes to be easily identified, allowing the model to be used in a broad range of fields (Ben-Akiva and Lerman, 1985 and Ben-Akiva, Bolduc and Bradley, 1993). Myers and Mullet (2003) attribute the models practical strengths to the 'Independence from Irrelevant Alternatives' (IIA) property underpinning the model. The IIA is where the scale values used to estimate individuals (*n*) value only calculates the value for the attributes and individual characteristics that make up the alternative. That is, the value for two alternatives is unaffected by other attributes within other alternatives. This is

because the attributes are considered close substitutes and have an equal probability of being selected. However, McFadden (1986, p. 280) describes the IIA as both: *"a blessing and a curse"*, demonstrating that despite its practical advantages there is a number of limitations with the underlying property. In a recent review of using conditional logit models within DCE research, Ryan *et al.* (2008b) along with Lancsar and Louviere (2008) suggest that assuming there is equal competition between two sets of alternatives can be considered convenient. In reality, consumers make choices about two alternatives that can be affected by other alternatives. Perhaps, as expected, developments outside the marketing field have attempted to get around the IIA property underpinning the conditional logit model. This has involved econometricians developing a 'Generalised Extreme Model' that relaxes the IIA rigidity for Gumbel distributed probability model and is referred to as nested logit model.

4.2.5.3 Nested logit model

First developed in the early 1970s (Ben-Akiva, 1973) the nested logit model estimates choices for multinomial data. Train (2003) describes how nested logit models are particularly appropriate when estimating utility for alternatives that are divided into nests (or subsets). It can be assumed that the IIA property holds when measuring utility for two alternatives that are contained in the same nest. Nevertheless, the IIA property is relaxed when estimating utility for alternatives that are contained in different nests. In other words, the attributes contained outside the nest can have a direct influence measuring utility between two alternatives (Manski and McFadden, 1981; Train, 2003; Scott, Ubach, French and Needham, 2008). This differs from the traditional conditional logit model that estimates the probability between only two alternatives regardless of any similarities to other alternatives in the choice set. In the first comprehensive review into using nested logit models to analyse multinomial data Louviere *et al.* (2000, p. 182) state: *"The great challenge for researchers and practitioners is to*

explore these advances with at least one objective in mind – that of establishing grounds for rejecting the simpler choice models in the interests of increasing our understanding of the choice process, and hence improving the predictive capability of our set of behavioural response tools"; however, findings from this review were mixed. It was discovered that despite attempts to relax the IIA property much more research was needed before the conditional logit model could be replaced. The writers discovered that although there were apparent advantages in relaxing the IIA assumption, there was also a number of serious disadvantages associated with using the nested logit model. The main criticism concerned how it estimates the data. Stern (2000) argues this is due to nested logit models being extremely difficult to interpret. Louviere *et al.* (2000, p. 144) agree, describing nested logit models as requiring: *"advanced Bayesian methods, and require very sophisticated knowledge and expertise"*, implying that before deciding to use a nested logit model, analysts require advanced training. It is also the case that the nested logit model should only be developed by analysts who have much experience in analysing and interpreting conditional logit models, as the data can be prone to errors. Other weaknesses associated with the nested logit model concern the number of levels the model can estimate. Lusk and Hudson (2004) along with Hensher *et al.* (2005) argue that nested logit models are more suitable for estimating attributes that contain as few as two levels, clearly showing that nested logit models are better suited to estimating smaller experimental designs. Finally, it is of no surprise that a review of the extant published DCE research finds very little evidence of nested logit models being used to analyse DCE data, this is further acknowledged in column 5 in Appendix B showing 37 of the 57 previous studies have used the conditional logit model within DCE research.

In response to this criticism, Train (2003) with contributions from Daniel McFadden, Jordan Louviere, Moshe Ben-Akiva and David Hensher, conducted a critical review into the IIA property underpinning the conditional logit model. The purpose of the critique was to re-visit the benefits of estimating multinomial data based on the IIA assumption. On the whole, the results from this research reported the overwhelming support for the principle acknowledging several strengths which make it preferable to using Generalised Extreme Models. One of the most important features of the IIA property is that on average it presents an accurate representation of reality (Trains, 2003). In fact, the IIA property is one of the fundamental principles which forms the foundation to probability theory (Luce, 1959), acknowledging moreover, that conditional logit models are based on sound mathematical theory. The IIA property also allows analysts to estimate utility for only a proportion of alternatives that make up an experiment allowing the relationships between specific alternatives to be elicited. This suggests that the IIA property could be used to investigate particular alternatives in future research projects. The IIA assumption also allows only a subset of alternatives to be examined as the alternatives outside *the nest* fail to influence the utility between the two alternatives. To date, the research based upon the IIA property has provided a new opportunity to estimate consumer choice based on sound and tested theory (Thurstone, 1927), thus improving the accuracy and overall quality of choice research.

4.2.5.4 Logit and probit models

In addition to the multinomial probability models, Hensher *et al.* (2005) acknowledge the probit and logit models offer a flexible technique to estimating binary data (would you rent this accommodation: yes/no). Traditionally, a mixture of probit and logit models have been used to estimate binary data using DCEs (Ryan and Farrar, 1994 and Ryan and Ratcliffe, 2000). Nevertheless, Section 2.3.1 discussed how choosing a probability model was dependent on the

distribution of the random variant. Louviere *et al.* (2000) argue the probit model assumes the random component follows a normal distribution represented diagrammatically using a normal distribution curve (see Appendix Q). Since Anderson, Sweeney and Williams (2000) acknowledge normal distribution to represents both sides of the distribution curve (in other words both sides of zero), normal distribution assumes a proportion of people to be positive and the other potion to be negative. Yet Train (2003) argues by assuming a portion of distribution is positive; for example, the attribute price, then normal distribution automatically assumes a percentage of people have a positive reaction to price. Hence, the results taken from a normally distributed model are highly inappropriate and very likely to be incorrect; thus suggesting similar to multinomial data, normal distributed models are unsuitable for measuring binary data. In fact, much of the extant research over the last 50 years into measuring utility for binary data using models that are in line with axioms of consumer theory (as discussed in Section 2.3) reveals random variants of a person's utility are Gumbel distributed (Luce, 1959; Marschak, 1960; cited by Luce and Suppes as Marley 1965; Luce, 1977; McFadden, 1974; Louviere *et al.* 2000). In essence, acknowledging the random variants (ε_{in}) are independent and identically distributed, represented using logistic distribution in which distribution is only measured on one side of zero, prevents a portion of people from having a positive coefficient (see Appendix R for an example).

This section has presented only a brief review into probability models. Other families of probability models referred to in the broader literature are 'Heteroscedastic' and 'Flexible' models, but these models remain in their infancy and currently outside the scope of this study. However, it is worth noting that the application of nested logit models is discussed in Chapter 7.

4.2.5.5 Why choose to use the conditional logit and logit models

The discussion presented in 4.2.5.1 illustrates the development of probability models within DCE research. Selecting a probability model is highly dependent on how the random component that makes up consumer choice is distributed. For the majority of studies over the last 40 years, Gumbel distributed models have been used, specifically applying the conditional logit model. Well cited advantages of this model include the axioms to be well grounded in probability theory (McFadden, 1973; Louviere and Woodworth, 1983; McFadden, 1986 and De Bekker-Grob, Ryan and Gerard, 2010) and the consistency of the results (Hensher *et al.* 2005). Despite efforts to relax the IIA property, working examples remain limited and contain a large number of practical issues. Nevertheless, support for the IIA property is growing, with Amaya-Amaya *et al.* (2008, p. 32) arguing when: *"faced with this wide range of modelling options, the researcher is advised to start him/her analysis with the simple conditional logit model (MNL). This is to ensure that there are no problems in the data hindering estimation"*.

From a distribution point of view, normal distributed models are highly inappropriate and shouldn't be used to estimate respondent utility. The convenient assumptions of normal distribution lead to perverse estimates that are often inflated by the assumption that a portion of respondents' utility will be positive. In response, conditional logit and logit models are distributed according to Gumbel distribution; therefore, rejecting the assumption that part of a person's coefficient has to be positive. In this case both conditional logit and logit models are appropriate for measuring multinomial and binary data. These two models along with the problems associated (highlighted in red) with GEV and normal distributed models are shown in Figure 4.6.

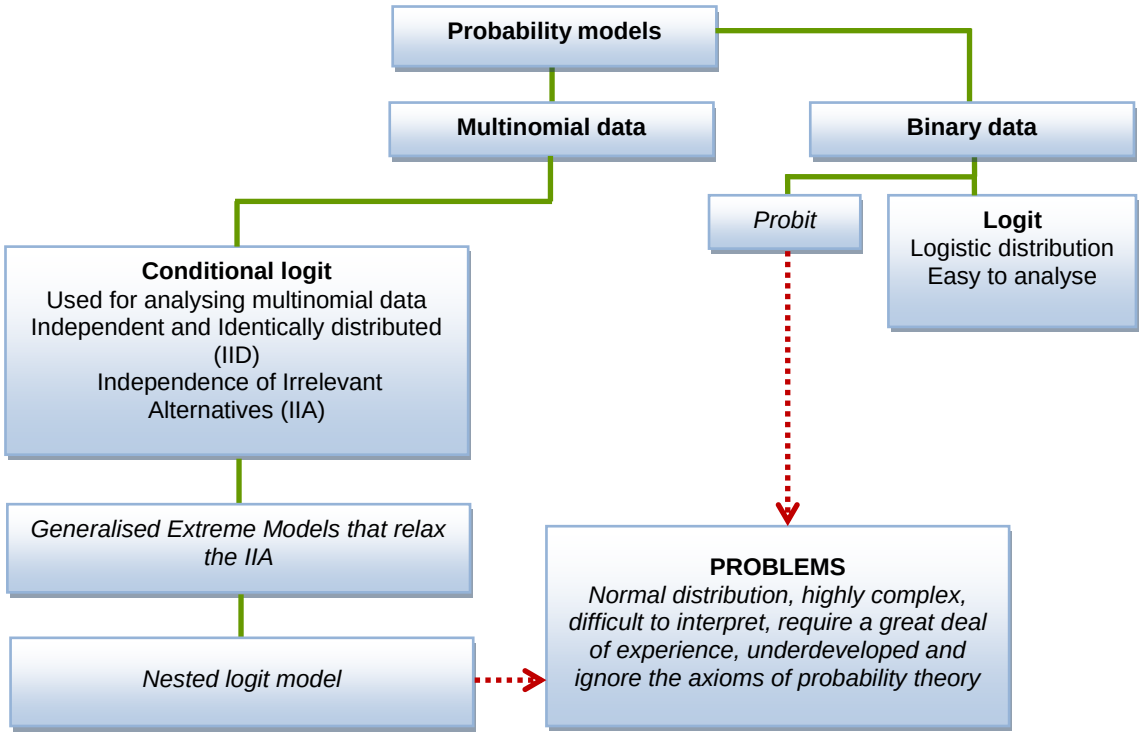


Figure 4.6: The different types of probability models

4.2.6 Logistic regression: the principles

The degree of a change in the distribution of the random component is discovered using logistic regression analysis. According to Tabachnick and Fidell (2007) logistic regression is appropriate when the independent variables that make up an experiment are a mixture of *categorical variables,* where a variable has two or more categories and there is no intrinsic ordering to the category and *continuous variables* when any value of a variable is possible and, therefore, multivariate normality assumptions will not hold. Warner (2008) agrees, further adding that the ordinary least squares assumptions that underpin multiple linear regression are unable to estimate with accuracy the coefficients for a responses variable when it is considered dichotomous. In other words, the response variable is divided into two equal parts e.g. yes or no.

The main problem with using ordinary least square assumptions to estimate dichotomous data are more often related to the principles of probability. Warner (2008) argues that there are at least two issues with using probability theory when estimating dichotomous data. First, by definition, probability theory is limited to elicit answers between 0 and 1. However, using multiple linear regression analysis to estimate data when the outcome is dichotomous can produce results that are not restricted. A working example of this is not presented here but can be found in Hosmer, Lemeshow and May (2008) emphasising the need to develop a model that can limit probability estimates between a range of zero and 1. Other more value related issues are associated with the properties of the independent variables. If one or more of the independent variables is quantitative then Warner (2006) warns that this can have a direct effect on the scores generated by the independent variables. For studies using multiple linear regression analysis with one or more quantitative independent variables this can produce estimates that are nonlinear. Indeed, the effects of this can be found in Warner (2008) representing results that follow a sigmoidal function rather than those more commonly found in ordinary linear regression. The major criticism with these types of results is that linear models do not capture the scores when the model begins to flatten, further violating the assumptions held by ordinary logistic regression, thus providing a further argument to reject linear regression analysis when modelling dichotomous data.

In an attempt to solve these issues with estimating dichotomous data Warner (2008, p. 936) claims: "*we need a transformed outcome (response) variable that can give us predicted probabilities that are limited to a range between 0 and 1 and that has a linear relationship to scores on quantitative X predictor (independent) variables"*. From these demands logit models can satisfy these requirements. Estimation of dichotomous data using the logit model is calculated by examining the frequency of the odds. By investigating the number of times an

outcome of interest does happen by the number of times it does not happen, the odds of an outcome can be estimated (Warner, 2008). The higher the reported odds the more likely an outcome will happen. The main advantage of using odds rather than probability to calculate the chance of an event is that odds do not have an upper fixed value (Todman and Dugard, 2007). However, the absence of an upper limit means that odd ratios do not tend to be normally distributed. In a recent study examining the effects of odd ratios used within logistic regression analysis, Warner (2008) discovered that the values of the odds ratio do not tend to be linearly related to the scores on quantitative independent variables. However despite these unfavourable features, Warner (2008) reports that by adding the principles of natural logarithm, (that the power to which the log must be raised to equal the score of the independent variable) based on the mathematical constant then although the normal curve is determined for the values of the independent variables from -∞ to +∞ the total cover is finite meaning all values must fall between zero and 1 (Warner, 2008). This view is also accepted by Holdsworth in Nind (2005) in their study investigating the attributes that influence student choice of institution.

4.2.6.1 Goodness-of-fit (an attempt to test the model and individual variables)

Goodness-of-fit is a set of procedures used to test how well a probability model measures a set of observations. There are two types of inferential tests that are used in logistic regression to access goodness-of-fit (Tabachnick and Fidell, 2007). These include testing the model and testing the individual variables. Amaya-Amaya *et al.* (2008) suggest calculating the overall significance of the model to be a good starting point. The main methods of testing a model's significance are the log likelihood ratio test, Pseudo R^2 , Deciles-of-risk, Akaike's information criterion (AIC) and Bayesian information criterion (BIC). The three most preferred methods by most authors including, Holdsworth and Nind, (2005) is the log likelihood ratio test, Pseudo R^2 and Deciles-of-risk.

4.2.6.2 Why the log likelihood ratio test?

The log likelihood ratio test is where a comparison between the value of the log likelihood function of the estimated model at convergence (including the independent variables) is compared with that of the intercept (excluding any of the independent variables). This is represented mathematically in equation 1.

(Eq.1) $2(LL_{intercept} - LL_{estimated}) \sim X^2(_{number\ of\ new\ parameters\ in\ the\ estimated\ model})$.

Amaya-Amaya *et al.* (2008, p. 32) describe where X^2_{k-c} is a chi-square distribution with the difference in the number of parameters estimated in the model (k) and that of the intercept model (c) as the degrees of freedom. Nevertheless, Long and Freese (2007) argue that when analysing data that is not part of a group and is longer independent, log likelihood ratio tests are no longer considered appropriate. Here Wald chi2 test allow data to be estimated. This is computed in Section 6.3.6.

4.2.6.3 Why pseudo R^2?

Furthermore goodness-of-fit for logit and clogit models can be estimated by using McFadden's (1974) pseudo R^2. This is different to R^2 as used within ordinary least square regression which calculates the square sum of the actual (y) values by the predicted (y) values (Warner, 2008). However, due to the iterative procedure required to estimate logistic regression models, seminal work by Domencich and McFadden (1975) show R^2 cannot be used as a measure of goodness of fit. As a result Amaya-Amaya *et al.* (2008) describe pseudo R^2 to represent the log likelihood of the intercept model as the total sum of the squares with the log likelihood of the convergence model representing the sum of the square errors. In other words the smaller the log likelihood value for the intercept model the better the chances the convergence model will fit the data. The main benefit associated with using pseudo R^2 is its flexibility with estimating uncertain data. Being able to statistically show how well the model fits the data allows academics to judge the usefulness of the model (Warner, 2008). However,

despite being commonly cited amongst the marketing literature, Tabachnick and Fidell (2007, p. 458) state: *"no single test is universally preferred"*, suggesting, testing a model's goodness-of-fit to be project specific. However, Long and Freese, (2007) stress that the more information known about a model the better the interpretation.

4.2.6.4 Why deciles-of-risk?

Finally, the deciles-of-risk statistic is where a model's goodness-of-fit is evaluated by splitting the data into 10 ordered groups. Respondents are assigned a group depending on the estimated probability of their outcome variable. For example, those respondents with an estimated probability of 0.1 would be placed in the lowest group, while those respondents with a probability of 0.9 would be placed in the highest. However, the deciles-of-risk statistic can only be used with binary data, using logit regression models, where respondents answer either yes or no. Following this, the respondents are divided into two groups based on whether, for example, they would rent first year accommodation or not. If the model fits the data, then the respondents who would, for example, rent the accommodation, have a value of 1 and will be in the higher deciles, with those who choose not to rent being positioned in the lower deciles. Furthermore, Warner (2008) warns if the model is not a good fit, then respondent results are spread evenly amongst the deciles for both outcomes values 1 or 0. Practically the deciles-of-risk statistic is calculated using the Hosmer and Lemeshow statistic.

The alternative to testing a model is to test the individual variables. These are known to test the value of the individual variables through either a residual or Wald test.

4.2.6.5 Why test for residuals?

Assessment of residuals is based on the difference between a model's predicted and observed outcome. If an observed outcome does not follow the prediction of the model values then these values can be considered outliers. However, there is

much debate on what classifies as an outlier. Long and Freese (2007) reports that there is no hard or fast rule into what classifies an outliner; however, Hosmer and Lemeshow (2000, p. 176) describe: *"in practice, an assessment of 'large' is, of necessity, a judgment call based on experience and the particular set of data being analysed".*

4.2.6.6 Why develop a Wald test?

The Wald test is where the squared logistic coefficient is divided by its squared standard error (Tabachnick and Fidell, 2007). This provides a ratio between the utility estimate and standard error. Traditionally, a Wald test is taken at the beginning of data analysis in order to measure the significance of the variables. If the value of a Wald test statistic is greater than critical Wald test value at a 95% confidence interval, then this can lead to nonrejection of the alternative and the exploratory variables are considered significant. However, several contributions over the last 10 years have expressed doubt concerning the accuracy of the Wald test. Menard (2002) along with Tabachnick and Fidell, (2007) suggest tests that calculate a model's goodness of fit, such as the log likelihood ratio test may offer a clearer insight into the variables that affect a model's behaviour. Nevertheless, despite this doubt over the accuracy of the Wald test, a review of the choice modelling literature finds the Wald test to provides valuable insight into the behaviour of model conditional logit and logit models (Kjaer, Bech Gyrd-Hansen and Hart-Hansen, 2006; Hall, Fiebig, King, Hossain and Louviere, 2007; Arana, Leon and Hanemann, 2008; Johnston, 2007; Rose, Hensher, Caussade, de Dios Ortuzar and Jou, 2009 and Carlos, Martin, Roman and Espino, 2008), with Hensher *et al.* (2005) advocating Wald tests to provide clear information for new researchers. These tests are summarised for each of the two models in Table 4.3

Measures of goodness-of-fit	Conditional logit	Logit
Log likelihood ratio test *(testing the model)*		
Pseudo R^2 *(testing the model)*		
Deciles-of-risk *(testing the model)*		
Wald test *(testing the variables)*		
Residuals *(testing the variables)*		
Count and adjusted count R^2 *(testing the variables)*		

= indicates that the measure can be calculated for this model

= indicates that the measure cannot be calculated for this model

Table 4.3: The available measures of goodness-of-fit for the conditional logit and logit models (adapted from Long and Freese, 2007, p. 106)

4.2.6.7 Coding the data

When designing a DCE it is important to consider how the exploratory variables are going to be coded. Typically this involves using effects coding or dummy variable coding. Hoyos (2010, p. 1598) describes how effects coding has distinct advantages over dummy variables as: *"they avoid correlation with the intercepts and minimise collinearity in estimation matrices used to estimate interactions"*, thus allowing the non-linearity of the data to be explored. In fact, closer inspection of the DCE literature shows a steady rise in the number of studies that have incorporated effects coding (Hall *et al.* 2002 and Lancsar and Savage 2004; Bech and Gyrd-Hansen 2005; Morkbak, Christensen and Gyrd-Hansen, 2010), suggesting effects codes to provide a flexible approach to estimating the significance between different levels. In this situation one level of an attribute is omitted in order to provide a reference level and can be defined as the negative sum of the L-1 minus the estimated coefficients (Gerard *et al.* 2008). The process of coding an omitted level is displayed below. In this case only 3 of the 4 levels that make up the attribute are coded, leaving the omitted level (in this case the 4th level) to be coded -1 for each effect rather than 0. A detailed account of how this was conducted for the levels incorporated in this study is found in Section 4.3.1.

Levels	EC1	EC2	EC3
1	1	0	0
2	0	1	0
3	0	0	1
4	-1	-1	-1

Table 4.4: The coding format followed within effect coding for an attribute with 4 levels (adapted from Lancsar and Louviere 2008, p. 670)

4.2.6.8 The constant value

It should be clear that when respondents take part in a DCE they are traditionally asked to choose between two alternatives. For example Course A or Course B. The information gathered from this exercise allows provisional demand for an alternative to be obtained. The provisional demand is, in essence the respondents' preference for the set of attributes that make up that particular alternative (Lancaster, 1966). More commonly logistic regression analysis has been used to estimate any additional utility of moving between levels within attributes (Louviere *et al.* 2000). In other words measuring respondent preference involves examining the utility between a difference model and the constant (Flynn *et al.* 2007 Breidert, 2006). However, in an article examining the way DCEs measure respondent utility Flynn *et al.* (2007) argue that care has to be taken to avoid developing a constant that is directly correlated with the attributes incorporated in the DCE.

For example in a DCE where three different alternatives are on offer; 'Course A, Course B and an opt-out', the constant can be described as representing a bundle of levels that cannot be decomposed into its component parts (Flynn *et al.* 2007 and Lancsar and Louviere, 2008). Nevertheless, the formation of the constant is highly dependent on how the attribute levels in the regression analysis have been coded (Flynn *et al.* 2007). As previously discussed in Section 4.2.5.3 there has been recent concern in the Health economic literature (Bech and Gyrd-Hansen, 2005; Flynn *et al.* 2007 and Ryan and Watson, 2009) about

the use of dummy variables when conducting DCE research. The main criticism of dummy variables is how they define the constant. Dummy variables involve coding attribute levels 1 with the lowest attribute level being coded 0. When using dummy variables to estimate utility for a DCE, the lowest level of an attribute is omitted (to avoid collinearity) and used to create a reference case. For the purpose of regression this reference case becomes the constant. The constant can be described as representing the utility for the omitted levels. After this, the coefficients for the remaining levels are totalled to create the utility for the attribute. Thus, the utility between the attributes is always measured against the constant value. However, this can lead to the coefficients of the attributes and the omitted levels being correlated (Beck and Gyrd-Hansen, 2005). In other words the choice of the reference case to create the constant has a direct influence on the parameter estimates of the remaining coefficients. Therefore, effects codes are more commonly used. Hoyos (2010) argues that effects codes offer an increasingly flexible approach to estimating utility that avoid the threat of correlation. Although the lowest level of an attribute is also omitted, it is defined as the negative sum of the estimated coefficients (Beck and Gyrd-Hansen, 2005). The associated value of this level is brought together for all attributes to provide an overall mean to represent an average across the sample, further internalising the constant preventing it from being correlated with the attribute levels. In other words, when estimating the utility or reservation price using effects codes the ‘constant’ provides a basis for which a general level of preference for all attributes can be obtained. Watson, Ryan and Watson (2009) agree, describing the constant in a DCE as the general preference towards choosing a product.

4.2.6.9 Validity

Malhotra (2004) argues that when analysing experimental data great care has to be taken to ensure that the research outcomes are not impacted by the interactions external to the experiment. In other words, much time has to be taken to ensure the validity of the research. Validity can be described as the degree that the DCE measures the intended quantity (Carmines and Zeller 1979 and Lancsar and Louviere 2006). Typically, there are two types of validity: internal and external. However, the fact remains that as most developments of DCE have been conducted in health economics, the conditions of the health care market make it difficult to test for external validity; instead, internal tests have been more recently applied. Today, a recent review into testing internal validity found that 56% of all DCE research in health economics over the last ten years tests for theoretical validity (De Bekker-Grob *et al.* 2010). This involves checking whether parameter estimates are moving in the expected direction and providing an indication that movement in the parameters is consistent with a *priori* expectations (Lancsar and Louviere 2008). Furthermore, the review acknowledges that there is growing interest in improving the face validity of DCE research. More commonly, this involves time spent in pilot studies discussing the layout of the survey and respondents' level of comprehension. The implication is that there is a growing need to test face and internal validity when developing DCE research. Finally, no evidence of testing reliability can be found within the critical literature, because the data is collected through experimental conditions and cannot be used within longitudinal studies. This would indicate that validity is the main instrument in evaluating the consistency in the overall research design.

So far, the theoretical principles of logistic regression analysis have been discussed and that in order to fulfil the aim of developing a DCE the assumptions of ordinary linear regression have been rejected. The two most appropriate types of probability models used within logistic regression analysis have been

introduced: the conditional logit model for analysing multinomial design data and the logit model for analysing binary data. However, in order to ensure the outcomes from the two models fit the data, the principles underpinning the goodness-of-fit tests along with coding the data, have also been discussed with the outcomes from these tests being presented in Chapter 6. Therefore, the remainder of this section explains how the data was organised for the two models and the procedure which was followed to analyse the data.

4.3 The procedure used to organise the data

The data was uploaded from the completed surveys and stored in PASW Statistics 18 (formally SPSS) before being transferred onto Stata (Version 11). The decision to use Stata was taken after discovering it to be one of only a few software packages that permit logistic regression to be estimated using a variety of probability models, such as, conditional logit and logit models.

The first step was to separate the data according to the two different sections of the survey. The importance of this is noted by Long and Freese (2007, p. 294) who describe when using conditional logit models that: "*Stata require that the data be arranged differently from other (probability) models".* For data taken from the multinomial design (Section **One**) of the survey, the data was arranged in accordance with the total number of alternatives *J= 3* (Course A, Course B and neither nor) before being multiplied by the total number of available choices, thus providing $J \times N = 3 \times 32 = 96$ observation per respondent. On the other hand, for the binary design (Section **Two**), 1 row was used per question resulting in 8 rows per respondent. From here the data was cleaned with the data from any partially completed surveys also being added.

4.3.1 The procedure used for data analysis

The procedure used to analyse the data from the DCE was based on the seven step model (Gerard *et al.* 2008 and Ryan *et al.* 2008b) first presented in Chapter 3 and is shown below in Figure 4.7.

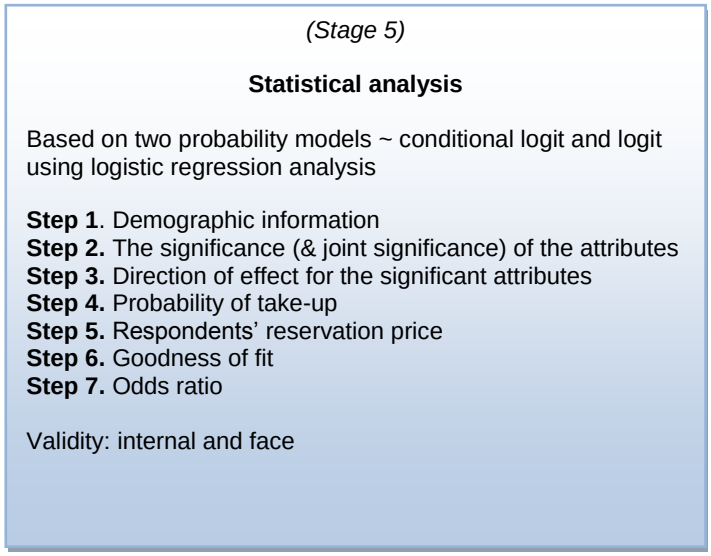


Figure 4.7: The seven steps of data analysis

The decision was initially taken to analyse the binary data first (Section **Two**). This is because it is commonly accepted that the logit model is the most straightforward model to interpret (Louviere *et al.* 2000). This revealed that the data contained no missing values and analysis of the data could proceed. In order to examine the impact of price on respondents' choice of accommodation, a new continuous variable for the attribute price was created. A copy of this procedure is taken from the log file and shown in Appendix S, as this allowed the full extent that price has on student preference to be examined. Closer inspection revealed an equal number of new values for each of the four levels. The logit command on Stata was then used to run the logistic regression command.

The procedure for analysing the data began by finding more information about the respondents who completed the survey. This was based on descriptive analysis with the findings from this model being presented in Section 6.3.1. Next the significance of the attributes was examined. This involved looking at the column labelled P>|Z| which contains the value of the attribute levels from the Wald test (as discussed in Section 4.2.6.6). Statistical significance was taken at a 95% (≤.005) confidence level to report which attributes have a positive influence of respondents' choice of accommodation. After this, the joint significance of the

attributes was tested. As discussed in Section 3.6.6 this procedure investigated whether the respondents' were viewing the attributes independently according to Lancaster's (1966) theory of choice. This involved using Stata to examine the relationship between the attributes found to have a positive influence of respondents' choice of accommodation. Following this, the parameter estimates for the attributes were investigated. This involved looking at the coefficient estimates for the attributes reported to be significant in order to discover respondents' indirect utility towards the attributes. Estimates found to have a positive value showed an increase in utility; consequently, any estimates found to have a negative value showed a decrease in associated utility. Although DCEs are recognised as being non-linear, Amaya-Amaya *et al.* (2008) acknowledge the utilities estimated from a model will be linear; therefore, allowing any change in respondents' utility for a product to be easily identified.

Once the statistical significance of the attributes had been discovered and the utility measured, respondents' reservation price could be estimated. This was computed by dividing the coefficient of any attributes found to be statistically significant by the coefficient of the cost attribute (Jedidi and Jagpal, 2009 and Ryan *et al.* 2008a). Despite not being a fundamental part of the thesis reservation price estimates for first year living accommodation were calculated in an attempt to get a greater understanding about the prospective students and were developed using dummy variables based on the constant term as discussed in Section 4.2.6.8. Although Bech and Gyrd-Hansen (2005) warn of the dangers of using dummy variables, Hoyos (2010) argues these problems are more commonly found when analysing multinomial data and moreover dummy variables were used. After this the logit model's overall goodness-of-fit was examined. The main advantage of measuring goodness-of-fit is that the results can be used to test how well the logit model is measuring respondent choices (or observations). This involved performing a likelihood ratio test and Pseudo R^2

using the dedicated software Stata. After careful inspection of the data further goodness-of-fit tests were performed to investigate the per cent of correctly predicted observations. This involved taking a Count R^2 test again using dedicated computer software Stata. The goodness-of-fit tests concluded by looking at the residual values generated from the logit model. The findings from these tests are reported in the following chapter. Analysis of the logit model concluded by testing the odds ratio. This is seen as an extension of the regression command only testing the attributes found to be significant. This involved using Stata to generate the data to see what probability of respondents would chose living accommodation when the alternative variable was kept constant. Ronning (2002) describes an alternative specific variable as an attribute that is identical to all respondents. In this case the alternative specific variable was the attribute 'cost'

Once the analyst had experience of running and interpreting the logit model, the next step was to move onto analysing the multinomial data (Section **One**). As previously mentioned this involved using the conditional logit model because the respondents could choose between two or more alternatives and supported by sound probability theory (Luce, 1959). The process of analysing the data began by creating effects codes using Stata for the attributes 'number of points, quality of accommodation, distance from home, number of contact hours and course structure'. This involved omitting the lowest level from each of the five attributes; therefore, allowing a reference level to be created (see example of creating effects codes in Appendix T). Despite the need to create effects codes, the attribute price was left to be continuous. This was to allow the price variable to run between £0- £12,500 pounds, in order to discover the full effect price has on respondents' choice of course. Once the data had been coded the conditional logit command on Stata was used to run the regression analysis.

As with the logit model, respondent demographic information was analysed in order to provide an introduction to the research. Once respondents' demographic information had been analysed, the statistical significance and joint significance of the attributes was estimated. Again, this involved checking which attributes were reported as being statistically significant at a 95% confidence level using the P>|Z| column. Attention then turned towards estimating the indirect utility associated with each of the levels reported to be statistically significant; therefore, allowing any change in respondents' utility for a product to be easily identified. This involved using the column labelled 'coef', with any positive values showing an increase in utility and any negative values showing a decrease in utility. Furthermore, these estimates can be used to estimate the probability that respondents will choose one alternative over another. The first step in estimating the probability of take-up was to construct four hypothetical degree courses made up of the attributes found to have a statistically significant influence (≤ 0.005) on

respondent choice of course (detail on these four courses is found in Chapter 6). This allowed the indirect utility between the four courses to be calculated (a breakdown of these calculations is shown in Chapter 6) as detailed in Ryan *et al.* (2008b). Next, the indirect utility estimates were then used to compute respondents' probability of choosing the four courses. Following training at the University of Aberdeen a 'what if' scenario was also developed to discover the variation in probability when a new hypothetical course offering free tuition fees was introduced. Thus, allowing the probability of take-up to be estimated for courses priced between £0 and £12,500 per year.

For each of the attributes found to be statistically significant, respondents' reservation prices were then estimated. This was done by dividing the value of the parameter estimates taken from the attributes found to be statistically significant and dividing them with the parameter estimates taken from the cost attribute (Breidert, 2006; Ryan *et al.* 2008b; Jedidi and Zhang, 2002 and Jedidi

and Jagpal, 2009). These were then added to the constant term in order to provide a basis for calculating respondents' total reservation price.

Following this, Stata was used to examine the conditional logit model's overall goodness-of-fit. Rather than developing a Likelihood Ratio test a Wald Chi2 test was developed, because when analysing data that involves clusters, observations are no longer independent. Therefore the significance of this fit was estimated using a Wald Chi-squared test and pseudo R^2. The results from these tests are presented in Chapter 6. Analysis of the data finished by checking the odds ratio. As with the logit model this involved looking at the alternative specific variable to calculate the probability that respondents would chose a degree course when the alternative variable was kept constant. The process finished by checking the validity of the models. Similar to the logit model, validity was checked by examining the direction of the coefficients in order to check the theoretical properties of the model. This revealed both models to have sound internal validity, assuming the respondents to react *a priori*. Face validity was also checked showing improvements made to the survey instrument during the pilot stage ensured most respondents completed every choice set.

4.3.2 Validating the development of the DCE

When deciding to conduct research Louviere (2006, p. 185) argues: *"virtually all major scientific breakthroughs result from cross-disciplinary analysis"*. However, Hoyos (2010) suggests that the ability to understand a variety of theoretical disciplines can be highly complex and require additional time and planning. Areas of knowledge required for developing a DCE include judgement and decision making, discrete choice models, experimental design and discrete multivariate and Bayesian statistics (Louviere and Flynn, 2010). In order to ensure that the analysis was correct a final meeting was arranged with Professor Mandy Ryan and Dr Verity Watson at the University of Aberdeen to validate the analysis. Due to the highly statistical nature of the study, it was felt important to validate the

results by experts in the field. Feedback from the meeting was positive and meant that an in depth analysis could begin to be developed. The process of validating the development of the DCE is shown in Appendix U.

The diagram in Appendix U shows that over the course of developing the DCE the results were evaluated five times. Hensher *et al.* (2005) describe how sharing detail about the procedures used to construct a DCE can shed new light into developing a DCE design. Academics involved in validating the results for this study are given in Table 4.5. This study includes contributions from the DCE founder Professor Jordan Louviere along with leading DCE health economist Professor Mandy Ryan. This has provided a strong underpinning for the analysis of the study.

Validated by	Position/Institution	Number of refereed publications on DCEs	Number of years researching DCEs
PROFESSOR MANDY RYAN	Professor of Health Economics at the Health Economic Research Unit at the University of Aberdeen	56	24 years
DR VERITY WATSON	Senior Research Fellow at the Health Economic Research Unit at the University of Aberdeen	10	14 years
PROFESSOR JORDAN LOUVIERE	Professor of Marketing at the Centre for the Study of Choice at the University of Technology Sydney	96	28 years
DR TERRY FLYNN	Senior Research Fellow at the Centre for the Study of Choice at the University of Technology Sydney	8	9 years

Table 4.5: The academic record of the researchers who validated this DCE

4.4 Ethical considerations

According to Foskett and Hemsley-Brown (2001), when carrying out primary data collection in an educational environment there must be evidence of ethical considerations. In order to comply with the University's Ethics Committee a full Criminal Records Bureau (CRB) disclosure was obtained to allow access to prospective students, which is a legal requirement in England when working with respondents under the age of eighteen. Data was collected in accordance with Northumbria University's Ethics Committee. Individual and organisational consent forms were distributed and collected. Organisational consent forms were signed by each school with respondents asked to sign individual informed consent forms. These were attached to the back of each survey outlining the purpose of the research. Parental consent forms were also obtained for Stage 1 of the study. The University Ethics Committee recommended that only individual informed consent forms should be obtained. Furthermore, data that was stored

electronically was password protected, acknowledging the University's Ethics policy. Data that was not stored electronically was stored in a locked filing cabinet, preventing external access. See Appendix (V) for a copy of these forms. It is also the case that the ethical procedures were adhered to during all stages of data gathering and including the presentation of interview findings (detail of this is presented in Chapter 5). In order to ensure respondent anonymity feedback is reported aggregately for the individual schools. Finally, in October 2009 this procedure was audited by the 'Northumbria University Research Governance Review', which confirmed that all the data collected during this PhD investigation was conducted to a very high standard. The audit of the ethical approach followed within this study has involved independent reviewers.

4.5 Limitations

The methodological limitations of this study can be split into three main headings; validating the attributes and determining the levels, survey design and statistical analysis.

4.5.1 Validating the attributes and determining the levels

None of the respondents interviewed in the pilot study attended a faith specific school (e.g. Roman Catholic). However, the research literature provides no evidence of faith being a significant factor when investigating students' reservation price. Originally a North-East based faith school was selected to take part within the study; however, a convenient date was unable to be arranged. This may have resulted in providing an insight into student reservation price and faith; however this was not a specific aim of the study. Another issue with recruiting the voluntary respondents was that the Year 12 and 13 students were selected by the Head of Sixth Form. Langford and McDonagh, (2003, p. 29) argue that when selecting respondents you should ideally avoid using participants who are familiar with one another: *"especially when the session will cover sensitive issues"*. The range of respondents was therefore limited and may

have incorporated respondents from a close friendship group. One possible way of avoiding this would have been to have given the Heads of Sixth Form more time to think of possible respondents. However, this would have been difficult due to their own work commitments.

In deciding to incorporate stakeholders' views into validating the attributes and levels, an obvious issue to overcome concerned arranging the most suitable time to hold a focus group. Once the stakeholder respondents had been selected it became increasingly difficult to arrange a time convenient to administer the focus group. This resulted in five face-to-face interviews being conducted instead, taking an additional two weeks to collect the data. With hindsight it may have been better not to have attempted to arrange a focus group and to have considered meeting the stakeholders individually.

The limitations associated with validating the attributes and levels finish with respondents from School **C** being the only group of Student respondents to provide estimates on how much they would be willing to pay for first year rented accommodation, despite efforts from the analyst when working with Schools **B** and **D**. It is acknowledged that receiving estimates from all three schools would have confirmed the range estimates; however, these particular estimates were unable to be computed.

4.5.2 Survey design

There were a number of limitations associated with Section 3 of the survey. These problems are more commonly associated with the design of the questions. The idea that the respondents themselves add the number of siblings into a box for question 4 was unnecessary and provided several coding problems. As a consequence, the data took longer to upload than originally anticipated. With hindsight, just reporting that the respondents had a sibling at university would have provided enough information to construct a demographic profile of the respondents.

Other issues were found with question 5. Respondents were asked to estimate their household's income to identify any relationships between income and core decision making variables. Although the survey had undergone an extensive piloting process, one of the income brackets was incorrectly labelled. The label read £80,000 to 89,000. If uploaded accurately this should have read, £80,000 to £89,999, acknowledging a £999 deficit. It was, therefore, decided to exclude any responses which included this bracket to maintain accuracy. For question 6 a fourth and fifth option should have been added. For one respondent their parents/guardians were retired. This was an issue that was not discovered in the piloting of the survey. As a result, the coding was increased to allow this to be reported. Although not required for this research, a fifth option should have been available if the respondents' parent/guardian was unemployed. Similarly for question 8 a third option should have been added. This would have allowed respondents to indicate if they were interested in applying to both pre- and post-1992 universities. This problem was corrected when coding the data and a third label was created from respondents who had ticked both boxes. Moreover, question 10 was developed to discover how successful respondents had been academically in their GCSE results. However, recording the variety of these results was difficult. In the end the data was coded to show the students that had obtained grades 5 A-C grades and above with those who had not. Similar to question 4 this added additional time to the project when uploading the data.

On reflection, it would have been better to have uploaded the data and run a full logistic analysis for the pilot study before administrating the full survey. This would have identified potential coding problems. However, at the time a copy of Stata software was unobtainable; hence, the data could only be analysed once it had been collected.

4.5.3 Statistical analysis

One limitation with DCE research is that it estimates respondents' reservation price based on hypothetical preferences (or the indirect approach). Interest in identifying comparisons between indirect and direct investigations has increased (Mitchell and Carson, 1989; Cummings, Brookshire and Schulze, 1986). More commonly, direct studies are acknowledged as the 'gold standard' (Cummings, Brookshire, Schulze and Bishop 1986). However, as previously mentioned in Section 3.3, the direct approach suffers from bias, further measuring respondents' preferences upon economic interpretations of behaviour which are suggested to ignore true values, thus preventing direct data being used as a foundation to form a reliable comparison (Mitchell and Carson, 1989; Klose, 1999). This lack of consistency further prevents an accurate comparison of the two techniques. However, in a development from Knetsch and Davis (1966) investigation, a seminal study by Carson, Flores, Martin and Wright (1996) comparing 616 indirect and direct studies acknowledges indirect and direct estimates to be surprisingly similar. They acknowledged only a marginal difference between respondents' reservation price for hypothetical and actual market goods.

One main problem with uploading the data from the survey concerned its sheer volume. Despite respondents only providing single answers for Sections **One** and **Two** of the survey three rows of data had to be uploaded in order to acknowledge the degree of preference between alternatives. In total, over twenty-three thousand rows were needed to store the primary data into PASW Statistics 18. Despite having help to input the data this was an extremely time consuming process. Although alternative methods of collecting the data were available, including web-based surveys, the ethical procedures were highly adverse, and self-administered surveys offered a more academically viable approach to collecting primary data.

Initially, dummy variables were used to code the data for the multinomial design. However, once the analysis had been computed the findings from the conditional logit model revealed the underlying constant not to be significant. This made analysis of the data very difficult. One solution was to use effects codes rather than dummy variables. Results from this study showed effects coding to be a positive influence on analysing the data, with results showing the underlying constant to be have been a significant influence on respondent choice.

Another weakness surrounding the application of indirect approaches within English HE concerns the timing of the study. A previous investigation by Moogan *et al* (2001) suggest that prospective students of school leaver age associate differing levels of preference over the course of the application process, even though the study identified differences in preference between core decision making attributes over an eight month period. The study fails to understand or acknowledge the theory of consumer choice, suggesting respondents contain well defined preferences. These findings confuse the underlying theory, consequently disproving that prospective students' utility changes over the application process. Furthermore, the longitudinal study administered over a 14 month period was administered by a research team, meeting respondents every 14 days. Therefore the logistics of replicating a longitudinal study when developing a DCE take the study outside the boundaries of a doctoral investigation.

4.6 Chapter summary

This chapter has shown how the core stages that make up the methodological framework can be used as a foundation towards collecting primary data. Through closer examination of contributions presented by Crotty's (1998) a purely objectivist approach to discovering knowledge was rejected, acknowledging an intersubjectivity approach is necessary for the discovery of best fitting results. More specifically, a pragmatic approach was described as designing an approach

that works best for providing a great understanding for an environment. The steps taken to construct a DCE investigation were described highlighting the need for conducting logistic regression analysis. The chapter concludes by explaining the ethical procedures and the associated limitations of the study. Chapter 5 presents detail of the results taken from the interviews developed within the first stage of this DCE investigation.

Chapter Five

Exploring the attributes and discovering the levels

5.0 Introduction

This chapter discusses the initial study involving interviews and focus groups. The purpose of this research is to explore the attributes (the characteristics that make up a product) and levels (the different values of an attribute) that influence student choice of undergraduate degree course. The chapter begins by presenting the rationale for the interviews and how they were conducted. Student and stakeholder (as described in Section 3.1.1) respondents' opinion for each of the attributes is then presented in alphabetical order showing overwhelming demand for six of the nine attributes. The chapter finishes by presenting the attributes and levels to be incorporated in Sections **One** and **Two** of the survey instrument.

5.1 Revisiting how the student and stakeholder preferences were validated

The rationale for presenting the findings in this chapter was outlined in Chapter 4. However, it is important to remind the reader of the procedure followed in order to provide consistency in the thesis. The process of validating the attributes and levels can be split into two main areas: conducting the interviews and analysing the data. These are represented in Figure 5.1.

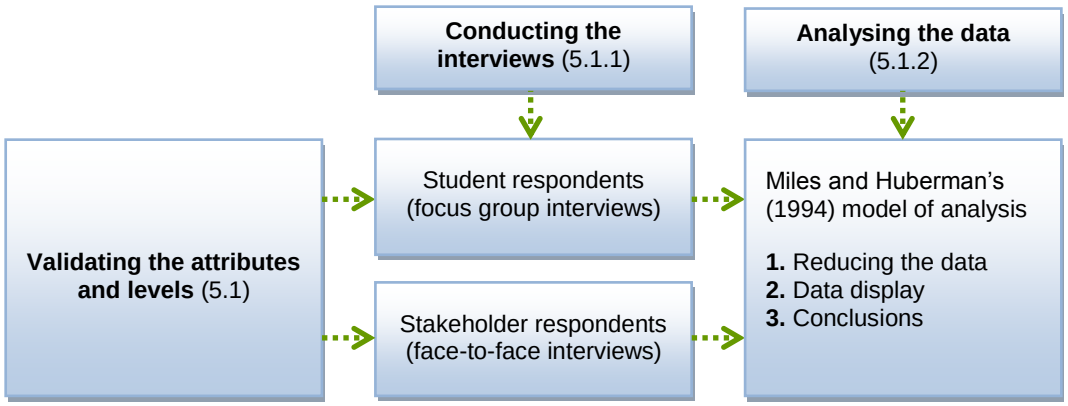


Figure 5.1: Conducting and analysing the data

5.1.1 Conducting the interviews

As shown in Figure 5.2 (over the page) the purpose of this part of the research was to investigate respondents' understanding of the attributes and whether they reflected what has emerged from the literature. The product attributes were validated over a three month period (December 2008 – February 2009) through a series of four focus groups and five face-to-face interviews. It was decided that mini focus groups would be used as they provide a good opportunity to receive a greater understanding of the areas that may be sensitive in nature and provide a clearer indication into how people behave (Morgan, 1998). As highlighted in Chapter 4, four focus groups were held at different schools across the Newcastle area and involved 28 sixth form students (as shown below in column 1 in Table 5.1). As mentioned in Chapter 4, secondary schools were limited to those in Newcastle area due to the resources available for the study. The Newcastle based schools were selected based on economic status. Ryan *et al.* (2008) reminds us that in order to gain sufficiently wide levels then a wide range of respondents should be targeted. Chapter 4 recalls how three of the four schools were state run and didn't require students to pay for their tuition (as shown in column 3 in Table 5.1). More specifically School **A** and **D** were classed as 'middle ground' schools and included respondents who didn't receive any financial assistance from the Government towards attending sixth form. On the other hand

School **B** incorporated respondents who although they didn't pay tuition fees were part of the Government 'Widening Participation' scheme. This meant they received financial assistance to attend sixth form and may have come from single parent, lower income or ethnic minority families (HEFC, 2009). School **C** was the only school that was independent and charged students a tuition fee.

Respondents N =28 (1)		School (2)	Status (3)
Male n=4	Female n=2	School **A**	Middle ground
Male n=1	Female n=7	School **B**	Widening participation
Male n=5	Female n=4	School **C**	Fee paying
Male n=4	Female n=1	School **D**	Middle ground

Table 5.1: The economics status of Schools A-D

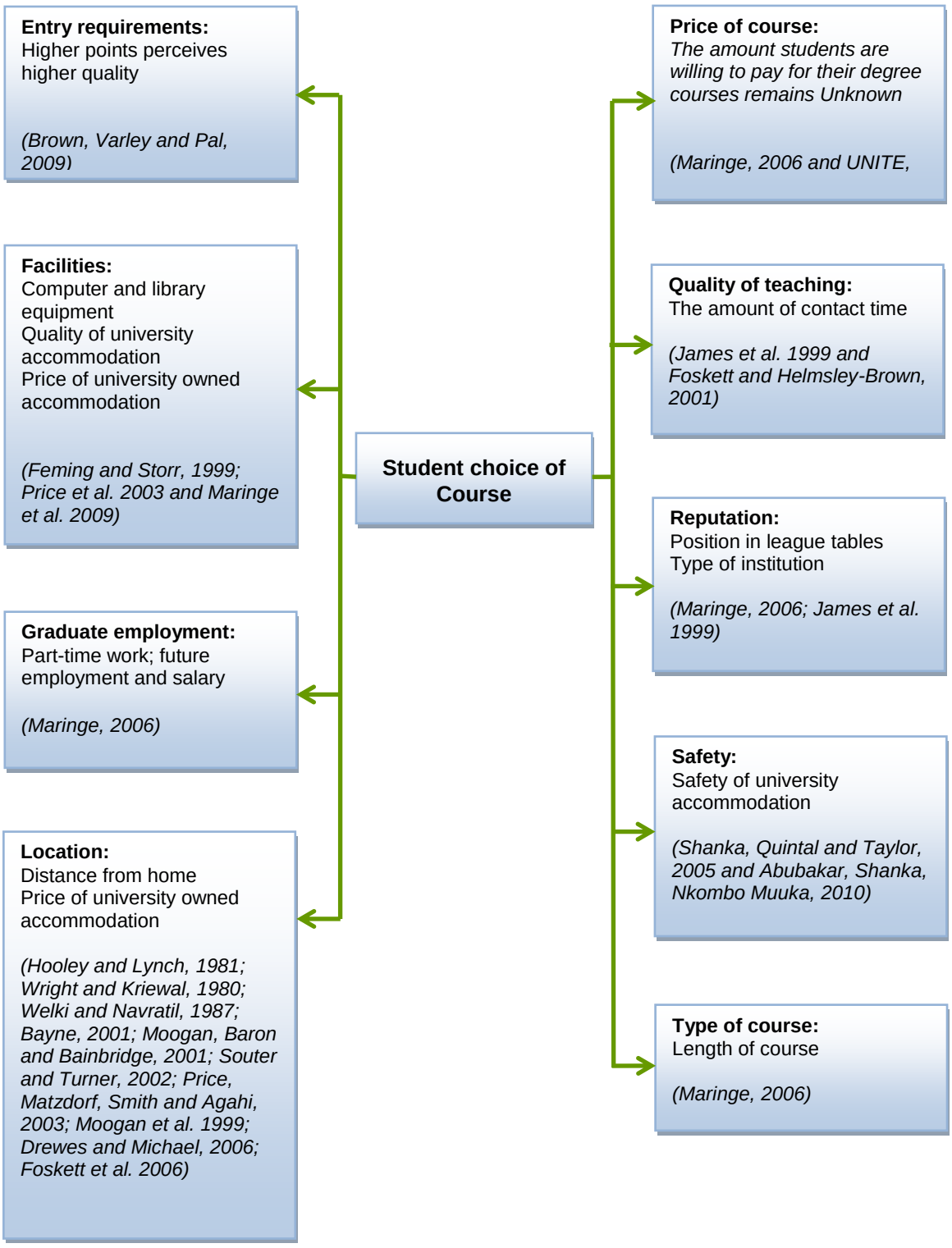


Figure 5.2: Preliminary attributes taken from the extant published research as discussed in Chapter 2

The voluntary respondents were between 17 and 18 years old and selected by the heads of sixth form. As previously discussed respondents were selected on the basis that they were interested in attending an English university (although some had also been to visit Scottish universities) and had no previous experience of attending university. Section 4.2.1 recalls how the focus groups were split into two parts. For the first forty minutes respondents were handed nine cards, each card containing one of the attributes taken from the extant published research. The respondents were not asked to rank the cards but simply asked to discuss each in turn and further highlight any other attributes that had not been considered. It was important to remind the respondents that there were no right or wrong answers and that there was no set order to discussing the attributes. This was crucial to reassuring the respondents that the attributes were all equal and removing any threat of bias towards any of the attributes. Once each of the nine attributes had been discussed, for the remaining twenty minutes, respondents were asked to consider the levels associated with each of the attributes. This involved exploring the various values respondents assigned with each of the attributes. Again respondents were reminded there was no right or wrong answers in order to encourage them to speak honestly about the attributes and their associated levels. The discussion finished with respondents being asked to consider how much they would be willing to pay for a degree course that contains all of the best values contained within each of the nine attributes. Throughout the discussion, the respondents' responses were digitally recorded and later transcribed.

Following the focus group discussions with the Student respondents a group of stakeholders was then interviewed. The different stakeholders are listed in column 3 in Table 5.2.

Respondents N =5 (1)	Gender (2)	Status (3)
One	Female	Admission officer
Two	Female	Parent
Three	Female	Student recruitment officer
Four	Female	HE careers advisor
Five	Male	Head teacher

Table 5.2: The different stakeholder respondents

Stakeholders were identified from published research on 'student choice' which was acknowledged to have an influence on the student decision making process. Respondents included an Admissions Officer, a Parent (mother), a Student Recruitment Officer, an HE Careers Advisor and a Head Teacher (Section 4.2.1 dealt with why these were selected).The decision was taken to carry out face-to-face interviews (rather than a focus group discussion) since securing a date that was convenient for all stakeholders proved unsuccessful. In addition, on reflection, as the focus group would have contained one respondent from diverse stakeholder groups, it was felt that individual interviews were more likely to ensure each 'voice' was heard. As with the student focus group discussions the format of the face-to-face interviews were split into two parts in order to discuss the attributes and levels. The same exercise as conducted with the Student respondents was repeated, ensuring equal preference was given to each of the attributes and to consider any other attributes that were not included on the nine cards. Again stakeholder respondents were reassured that when discussing the attributes and levels there no right or wrong answers. The final part of the interview was to explore how much they considered students would be willing to pay for a degree course that contains all the best values within each of the nine attributes. Similar to the focus group interviews, each of the five interviews was digitally recorded and later transcribed.

5.1.2 Analysing the data

As previously discussed in Section 4.2.1 the interview data was analysed using Miles and Huberman's (1994) model of data analysis (as recalled in Appendix D). The decision to analyse the data using this model ensured the process followed a highly structured approach to breaking down and storing the data, an approach Crotty (1998) acknowledges as being crucial when carrying out preliminary research. Initially, the data was uploaded onto dedicated computer software NVivo 8. For each of the attributes, transcripts were printed to evaluate the importance of the attributes. Following the decision to evaluate the attribute, codes were used to draw themes from the data (an example is shown in Appendix F). Miles and Huberman (1994) argue when drawing themes from qualitative data that the 'Noting, Patterns and Themes' technique is preferred. This is because it allows themes between a set of respondents to be identified systematically, thus allowing the most prominent theme to be discovered.

On a presentation note, student and stakeholder preferences are reported in this chapter. Since Student respondents were under the age of 18 the presentation of students' preferences was restricted by ethical considerations such as anonymity. In the light of this, Student respondents' preferences are reported alphabetically under the headings which correlate to the topics discussed in each focus group.

5.2 Attribute analysis ~ the themes

5.2.1 Entry requirements

Entry requirements were perceived as one of the major considerations when selecting a full-time undergraduate degree, with the entire group of Student respondents describing entry requirements as making them feel under pressure to perform, for example:

> "When *you achieve the entry requirements you sort of feel proud of yourself for having achieved like, become part of the elite that have done well enough to get there"*
>
> (School **A** Respondent)

Students regarded the UCAS tariff points system as being easily digestible and were all able to match their academic ability using the numerical scale. In fact Stakeholder (**Five – Head teacher**) believed the UCAS system to provide a sense of personal fit, enabling students to accurately position themselves between two sets of numerical bands. Respondents from School **A** agreed acknowledging entry requirements to be seen as a positive indicator on how well the respondents were progressing.

A key factor that was discovered, suggested that students associated higher entry requirements with a greater academic standard and further lower entry requirements with a poorer academic standard. Yet, interestingly, all of the stakeholders disagreed, arguing that higher entry requirements only reflects higher levels of student interest, and are only used as a filter in the recruitment process, stating:

> *"There is no perception in the market that higher points resemble higher quality"* (Stakeholder **Three – student recruitment officer**)

Consequently Stakeholder (**Four – HE careers advisor**) argued that secondary schools could do more to inform students and their parents why some courses demand higher points, relieving unnecessary stress. Yet a common theme amongst all of the Student respondents was that the courses that required higher points were also associated with traditional universities. This, therefore, suggests that courses that require higher points are more commonly associated with traditional universities.

Respondents from School **B** further placed greater emphasis on how prospective employers would perceive entry requirements, claiming higher entry requirements

were seen more favourably when searching for a well paid job. The respondents did not, however, clarify if they were referring to graduate or part-time employment. Nevertheless, the respondents who receive monetary support whilst at school, place greater emphasis on employment opportunities, than respondents from Schools **C** and **D**. This may be due to the parents or guardians of School **B** respondents having less experience of the requirements needed to secure a graduate job.

However, the focus between all student and stakeholder respondents centred upon the number of points required to obtain admission onto their prospective degree programmes. On average, respondents from School **A** were intending to seek acceptance on courses ranked between 280 and 320 UCAS points (BBC – ABB at A Level). Respondents from School **B** were intending to seek acceptance on courses ranked between 240-300 UCAS points (CCC – BBB at A Level). Respondents from School **C** were intending to seek acceptance on courses ranked between 300-360 UCAS Tariff points (BBB – AAA at A-Level). Finally respondents from School **D** were intending to seek acceptance on courses ranked between 180-320 UCAS points (DDD – ABB at A-Level). Therefore, students from School **C** are applying for courses that require higher entry requirements. In fact, respondents of School **C**, a fee paying school, all claimed to be aiming at courses that were no lower than 300 UCAS points, which was ranked highest out of all of the four schools. One reason for this may be that students from School **C** have greater aspirations than those from state schools.

5.2.2 Facilities

A key factor highlighted by the students was that quality and range of facilities were perceived to stimulate a student's learning whilst at university. In total, all of the Student respondents considered facilities to be a large factor in the decision making process, claiming:

"if they've got better facilities at one university, better programmes and all that then obviously I'm going to want to go there because I'll be able to do more while actually on the course, erm, basically do better work"

(School **A** Respondent)

When asked when they first considered facilities, both the stakeholder and the Student respondents agreed that the facilities were examined more closely when visiting the prospective university, with Stakeholder (**Three – Student recruitment officer**) stating:

"Students might not consider it at the very first stages when they are then filtering down their choice and visiting the universities and going to have look and they go into an engineering lab for example and see that that stuff hasn't been updated since the 1950s then yeah it's a massive influence"

This suggests Student respondents realise how important course facilities are when visiting a university. It also implies that both stakeholders and student respondents expect undergraduates to have access to up to date facilities that are transferable to the job market once graduating. Stakeholder (**Two - Parent**) described her positive surprise at the increasing number of university libraries that are open 24/7, further making campus based facilities more accessible. Stakeholder (**Five – Head teacher**) believes the accessibility of library opening hours to be increasingly important, enabling students' to have greater flexibility to study when working part-time, and further believing this to be even greater for students studying vocational based subjects. Interestingly, Student respondents from all three of the student cohorts regarded the size and accessibility of the library to be important, claiming:

"We went on an open day to Edinburgh because I was quite interested in going to Edinburgh University and I know they're doing a lot of building work there, but we went to have a look round the library as well and I was like really disappointed"

(School **B** Respondent)

In terms of the availability of I.T. facilities, the stakeholders seemed to regard this as a more important consideration than the Student respondents. Stakeholder (**Two – Parent**) however hadn't considered I.T. facilities assuming most students already have access to their own computers. Indeed, the Student respondents placed greater emphasis on the specific learning environment (e.g. the lecture theatres and seminar class rooms) rather than the availability of computers, implying most students have access to their own computer.

In terms of extra-curricular activities the Student respondents all commented that the 'Students Union' and 'Sport Facilities' were a major factor of influence when selecting a prospective course. Respondents from School **C** placed the greatest emphasis on playing sport, arguing that they were keen to represent their university sports team. In fact, students from School **D** placed less emphasis on the university sport facilities, with greater emphasis placed on the local amenities.

However, a common theme amongst the Student respondents was the quality and cost of their accommodation. In fact, all of the Student respondents described the need for internet access and en suite facilities (Price *et al.* 2003), further claiming shared bathroom facilities as:

> *"off-putting especially as you're spending a fair amount actually every week every month there I think you need and want the best possible thing for your money"*
>
> (School **D** Respondent).

This suggests students seek the highest possible standard of living. The stakeholder respondents supported this view highlighting the importance of access to first year student living accommodation. In fact, all the stakeholder respondents consider the standard and price of the accommodation to be very important, arguing that:

> *"they want double glazing and nice central heating and whatever else maid service probably and en suite bathrooms and a kitchen that's spotlessly clean all the time em so I think that has to be encompassed as part of the thing you're got to provide them with a home from home something that they can make their own"*
>
> (Stakeholder **Three – Student recruitment officer**)

In terms of the accommodation buildings, the entire cohort of Student respondents claimed they would look for accommodation that was in a central location, which offered access to local amenities. This suggests students feel they don't want to travel far and place much more emphasis on reducing possible travelling time.

Finally, in terms of cleanliness, students from all four schools described the need for clean accommodation with a respondent from School **D** describing:

> "*when my sister went to university I went to visit her on her first day and it was absolutely disgusting and I couldn't I was like that was quite important that is was like nice and new and not years of crap on it"*.

The need for clean living accommodation was also highlighted by stakeholders (**Two - Parent**) and (**Three – Student recruitment officer**) stating that Students and stakeholders are highly sensitive to poor accommodation standards.

However, in terms of cost of first year accommodation, Stakeholder (**One – Admission officer**) whose role as an admissions officer means she speaks to a large number of prospective students argued:

> *"I think students are prepared to pay more for something that's better to give them a quality of life that's a bit more comfortable shall we say and some student residences not just in this institution (Northumbria University) are perhaps a little bit outdated i think we need to come and bring ourselves into the 21st century and realise that as consumers... students want that little bit more and they want that little bit more comfort"*

This implies that students are keen to secure high quality rented accommodation and may be keen to pay more rent per week to avoid living in out of date accommodation. In fact the cost of accommodation was mentioned by all the Student respondents, with a respondent from School **C** describing how:

> *"when I think of cost I tend to think of like how much accommodation is going to cost and how much living is going to cost rather… because I'm like really worried about going to London and being like such a burden on my parents being like yeah I need money, I need money, so I tend to think of that more than the actual tuition fees,"*

This implies students are already concerned about the cost of living accommodation, and that London is regarded as the most expensive place to secure rented accommodation. Interestingly, however, in terms of the price charged per week, only respondents from School **D** were willing to ascribe a price to what they would expect to pay for the cost of first year accommodation. Surprisingly neither respondents from Schools **A**, **B** or **C** knew how much accommodation was charged per week despite being definite on what they would expect in terms of living conditions. Therefore an average for the four schools is only represented from School **D**, which they described they would be willing to pay between £50-70 per week for first year living accommodation. Nevertheless the cost of accommodation was mentioned by all the stakeholder respondents, expressing the price they would pay through the cost of accommodation per week. Stakeholder (**Five – Head teacher**) described the decision concerning the cost of accommodation as being very important, stating:

> *"the accommodation is key...er part of the decision where will be what's on offer and how much will it cost and that's probably up there with what's the facilities for the course that I am going to study"*.

This mirrors the findings from Price *et al.* (2003) suggesting the price to be a major influence in the decision making process. Interestingly Stakeholder (**One – Admissions officer**) believed students would pay up to £125 per week for accommodation; yet an average taken from the five stakeholder respondents suggests an average of £50-90 per week, thus implying that the cost of renting accommodation is between £50-£125 per week. Nevertheless, the findings suggest this to be slightly lower than market prices with on average student living accommodation in, for example, Newcastle costing between £80 and £156 per

week (Unite, 2011; Northumbria University Accommodation, 2011 and Newcastle University Accommodation, 2011).

5.2.3 Graduate employment

In terms of graduate employment a divide soon became apparent between the stakeholder and student respondents. In terms of the Student respondents, participants from each school admitted to thinking about what they expected to do once graduating. However, despite this, the stakeholders were in agreement that students place greater emphasis on the student experience than future employment opportunities, claiming:

> *"I don't know how much they think past their three year undergraduate degree course"*
>
> (Stakeholder **One – Admissions officer**)

When asked how many students had considered the employment rate of their course, a clear distinction was apparent from the Student respondents who were receiving financial help in the form of Widening Participation. Students from this background commented:

> *"Yeah again I think it's a security thing; if you I mean if you go onto a course and you sort of you complete it and then you get out of university and you still don't know where you want to go, still don't know you know what you're going to do from here on, it could end up if you don't have a plan or whatever of where you're going to do from here on, but if you've got a course which leads on to something else that's something else it's like it's sort of following that path"*
>
> (School **B** Respondent)

In fact only one respondent from (School **C**) claimed to have considered the employment rates associated with the course, stating:

> *"York for history was like 60% and that in some ways did put me off a little"*

suggesting in this case low employment rates to have a negative reaction for this respondent; however it was later discovered that the employment rates were only considered once they, the respondents, had applied to the course, acknowledging it to be less of a consideration on student choice.

Unsurprisingly, four of the five stakeholders believed students only really start considering placement opportunities once they are enrolled onto the course, again implying students only consider graduate employment after arriving at university. However Stakeholder (**Five – Head teacher**) disagreed, arguing that students who were considering vocational based subjects would be more attracted to placement opportunities within the application process.

In terms of postgraduate training, only respondents from School **D** admitted to expressing an interest, with the remaining respondents from Schools **B** and **C** admitting it was something they may consider once enrolled on their course.

In reference to finishing university, a respondent from School **B** placed great emphasis on their fear of debt, implying that there was a great sense of urgency to pay off any debt incurred whilst enrolled at university. However, the stakeholders believed that students have only a vague sense of what they wanted to do upon graduating, stating:

> *"they might consider it in a vague way like I'm going to be a journalist — I'm doing a journalism course so I'm going to be a journalist"*
>
> (Stakeholder **Four – HE careers advisor**)

suggesting that the students had no firm plans how to pay back any outstanding debt after graduating and that they were unable to comprehend graduating at this point in time.

However, when asked about a prospective graduate salary, all of the students said that they were seeking a well paid job that was in turn well recognised amongst their peers. Every Student respondent described that they expected to

leave university and earn at least £15,000 per year. The stakeholders, however, described students to be unrealistic about how much they would earn after graduating. In fact, the most recent figures published from the Higher Education Statistics Agency show in 2008/09 as few as 7770 graduates managed to secure manager classification occupations with a high portion having a tendency to secure administrative and secretarial jobs (www.hesa.ac.uk). More specifically Stakeholder (**Four – HE careers advisor**) described the vast majority of students to possess 'career fantasises', claiming:

> *"I think they consider earning between £25,000 and £30,000 when they leave"*

again describing students as being inexperienced in terms of predicting their starting salary.

5.2.4 Location

In undertaking a review of the nine attributes, the 'location' of the course stimulated a lot of interest, generating much discussion amongst the Student and stakeholder respondents. A key factor suggests that moving away to university seems popular amongst all four cohorts of students, therefore suggesting students are keen to develop independence. The students who wanted to move away from home believed moving away to university would provide them with the skills necessary to live away from home in the future and one student stated:

> *"you can kind of get that independence and kind of learn how to live on your own and stuff and gradually like make it easier for when you actually are er have got a flat or a house or something"*
>
> (School **B** Respondent)

Surprisingly, out of the twenty-eight students that took part within the study, only five wanted to remain at home, arguing:

> *"It's quite a scary prospect thinking that you're going to be living by, like you're going to have other people there but you're not going to have your mam and dad, so you're going to have to do all your cooking, your washing , paying bills for yourself, everything and sometimes like being eighteen, nineteen people aren't really ready for that"*
>
> (School **B** Respondent)

thus, suggesting lack of maturity of the students to be an important consideration in the decision making process. In fact, three of the five were from School **B** and the remaining two were from School **D**, suggesting that fee paying students are more likely to be encouraged to move away to attend university. It is important to note that despite more recent research (Paton and Prince, 2011) suggesting students may be increasingly put off moving away to university in order to reduce the cost of attending university, these findings were conducted based on the old funding regime (The Higher Education Act, 2004). Nevertheless, the findings from this research show Student respondents to be keen to move away to attend university.

In deciding whether to attend a city (located in the city centre) or campus (traditionally self contained and located outside of the city centre) based university, all of the respondents agreed this was an extremely individual decision. However, none of the Student respondents opted for a campus based course, claiming:

> *"Could just imagine getting bored after a like your first year's probably like really exciting because like its university and everyone's around you on campus.. but then like you know the parties and like the houses on campus and stuff like everything's there, it's all good but then like after a year I think you'd probably want to like diversify and like move away and stuff like that"*
>
> (School **C** Respondent)

The stakeholders agreed, arguing that prospective students value the accessibility of local amenities, including attractions such as night life and large retail shops which are a draw to prospective students. Therefore, this suggests that access to resources are extremely important. In fact, all the stakeholders

mentioned that incorporating a city based location provides students with good transport links, thus making travelling home more accessible.

When considering travelling home, the students regarded the distance from home to be extremely important, further measuring the distance from home in time (minutes) rather than miles (unit of length). Interestingly, the five stakeholder respondents also measured distance in minutes rather than miles, placing further emphasis on the time of the journey. In terms of time spent travelling, the Student respondents' average was between 45 and 180 minutes. The train was the most common means mentioned; however, flying was also looked on as a favourable means of transport. In fact, the students' discussion showed they were very well informed on how best to book and minimise the cost of travelling, with many of them boasting about how they knew where to obtain the best priced tickets.

5.2.5 Price of course

In terms of examining price, all the respondents were asked to consider price at the point of consumption. However the Student respondents all admitted not considering the price of their course within the decision making process. Price was seen to exist and was described as going hand in hand with the required total of entry requirements, suggesting price and tariff points to be the commodity of exchange when obtaining admission to a prospective degree programme. In fact, the Student respondents considered the location of the course to influence the decision more than the price of tuition. Respondents from independent School **C** considered fees only to be an influence for the parents, claiming:

> *"I think it's kind of different for us because we've already been paying for our education for like so long already"*
>
> (School **C** Respondent)

implying that fees were not seen as a deterrent within the application process. In fact one respondent from School **C** argued:

> *"Yeah we pay...paying more to school in tuition fees than the cost of university tuition fees"*

implying that the cost of attending university is actually cheaper than their current rate of tuition.

However, closer examination of the remaining cohort of students suggests the price of admission to be more of a factor and there was concern surrounding future debt. Respondents from School **B** specifically described how they would have to rely on loans as their parents couldn't afford to support them whilst at university. This, therefore, shows a divide between the School **B** and School **C** respondents in their attitude towards their method of payment.

However, despite this relaxed interpretation of paying towards the cost of tuition, all Student respondents from the four schools were happy to draw income contingent loans and pay back any of the incurred debt from attending university after graduating. However, none of the Student respondents claimed to have had experience of borrowing money, suggesting this imperfect knowledge may be a reason for the students' willingness to borrow money.

When asked to consider raising the price of tuition all the respondents reacted negatively. The Student respondents all considered the current price of £3,225 per year as fair and described no reason to increase the price of tuition. The concern over possible fees increase was discussed and this led some students to report they would begin to try to seek immediate employment. However, the point at which students reconsidered attending their course differed amongst the Student respondents. Table 5.3 contains a mean taken from the different cohorts of students showing the highest they would be prepared to pay towards the cost of their tuition before seeking an alternative career path.

School (1)	Mean (Price in pounds per year) (2)
School **A** (Middle ground)	£5,700 per year
School **B** (Widen participation)	£2,300 per year
School **C** (Fee paying)	£8,000 per year
School **D** (Middle ground)	£5,600 per year

Table 5.3: A mean to represent the Student respondents' reservation price

An early observation suggests students' reservation price varies between the four student cohorts. Respondents from School **B** considered the current price of tuition to be fair but ideally they would pay no more than £2,300 per year (as shown in column 2), £920 less than the current price. Interestingly, respondents from School **D** also considered the current price for tuition as fair, but an average taken suggests they would be willing to pay an additional £2,375 per year for their tuition. Similarly, respondents from School **A** also considered the current price of tuition to be fair, but said they would be willing to pay an additional £2,475 per year for their tuition. Finally, respondents from School **C** agreed they would prefer to pay on average an additional £4,775 a year towards the cost of their tuition. This, therefore, suggests students from more affluent backgrounds would be prepared to pay more than students from less affluent family backgrounds.

The students were further asked how much they would pay for their ideal course: a course that fulfilled their expectations on every one of the eight attributes. Table 5.4 contains a mean price taken from each group of respondents. Interestingly, Student respondents from cohorts **B** and **C** refused to increase the amount they would be willing to pay for their ideal course. Only Student respondents from Schools **A** and **D** admitted they would be willing to spend more to gain access to their perfect course. Closer examination reveals School **A** respondents reported they would spend an additional £1,300 and School **D** a further £1,800 per year in order to gain access to their perfect course. However, respondents from School **C** were still willing to pay the most at £8,000 pa.

School (1)	Mean (Price in pounds per year) (2)
School **A** (Middle ground)	£7,000 (+£1,300)
School **B** (Widen participation)	£2,300 (No difference)
School **C** (Fee paying)	£8,000 (No difference)
School **D** (Middle ground)	£7,400 (+£1,800)

Table 5.4: Student respondents' reservation price for their ideal undergraduate degree programme

In terms of stakeholder respondents a mean was taken for the highest they considered students would be willing to pay for a full-time undergraduate degree programme. A mean showed that the five stakeholders considered students would be willing to pay up to £5,845 per year on tuition fees, and an additional £3,155 for their ideal course at £9,000 per year. Interestingly, this price is in line with recent revisions to the Higher Education (2004) (as discussed in Chapter 1) that allows English universities from September 2012 to charge a fee (or payment vehicle – as described in Section 3.4.3) of up to £9,000 per year. Section 3.6.2 recalls that when working with the attribute price that it is very important to confirm that the right payment vehicle has been selected (Ryan and Wordsworth, 2000). Payment vehicles can be described as producing a hypothetical measure of respondents' reservation price (Smith, 2003). As discussed in Chapter 3, a review of the extant published research shows that payment vehicles within DCEs more commonly measure reservation price through assigning an overall price to the product alternatives. When asked about the method of payment, both student and stakeholder respondents considered paying for their university education in the form of a tuition fee, rejecting the notion that courses could be charged by paying a higher tax. This was perhaps expected as Student respondents had showed little evidence of comprehending graduate employment upon finishing university. The revisions to the Higher Education Act 2004 are reflected upon in Chapter 7.

5.2.6 Quality of teaching

A review of the transcripts showed that teaching quality was regarded amongst the Student respondents as being extremely important; for example,

> *"The teaching, the standard that could be provided as my primary motivator and I was prepared to accept compromise in pretty much any other area"*
>
> (School **A** Respondent).

However further examination suggests that this is a factor that all the Student respondents seemed to possess relatively little knowledge about. In fact Stakeholder (**Five – Head teacher**) argued:

> *"I don't think they consider it before application but I think once they're there it can become a factor... it perhaps should be"*,

suggesting this should be something English universities reflect upon when developing marketing strategies for prospective undergraduate students.

In fact, Stakeholder (**Four – HE careers advisor**) agreed, believing students only really considered the quality of teaching once they had enrolled within university. This was also a view that was supported by the respondents from School **C**, claiming that:

> *"I mean I'm sure pretty much all of the lectures and stuff at university are going to be pretty good er at least at the universities that we're going to be applying to"*

believing that the courses that demand a higher number of UCAS points will have the better quality of teaching.

Respondents from School **B** support this claim but also argue that receiving better tuition will impact on the chances of getting a job, further drawing upon the need for financial security after graduating. The same respondents linked teaching quality directly with class size. Respondents from School **B** believed that smaller class sizes would stimulate learning and lead to a better degree, again improving the chances of securing a job upon graduating.

However Stakeholder (**Three – Student recruitment officer**) described how students visiting a university are sometimes shocked by the delivery of teaching, stating:

> *"Yeah and then the comment on the evaluation form is I couldn't speak to the lecturer during the lecture yeah because there's about four hundred other people that want to do the same thing em so that whole staff to student ratio at that stage they don't fully understand the kind of situation they're going to be in"*

Students appear to have an idealistic perception of the university teaching and learning experience and that it is very similar to their secondary education.

In terms of measuring teaching quality, only one respondent out of all four schools could name an appropriate measuring scale, namely the Quality Assurance Agency for Higher Education or QAA. However the QAA scale that was mentioned was phased out in 2002, with the student claiming never to have considered the scale. Surprisingly, the Student respondents only admitted to looking at league tables post-application, believing the number of UCAS points, and if the course is recognised by a formal accreditation, to be a measure of teaching quality.

Furthermore, the students from all four schools perceived the quality of teaching to be improved if the course was professionally recognised. The Student respondents also associated professionally recognised courses as offering a greater chance of graduate employment, with the recognised courses being considered highly by prospective employers, claiming:

> *"I definitely would choose the university which was more accredited and well recognised by like employers and stuff"*
>
> (School **C** Respondent)

Therefore, this suggests that English universities may need to look at drawing attention to promoting professionally recognised courses in future marketing campaigns.

5.2.7 Reputation

In terms of reputation a divide soon became apparent between the student and stakeholder respondents. When taking into consideration the reputation of the course, one student respondent mentioned:

> *"I think it's important because if you go to, or anyway if you go to a university that doesn't have a brilliant reputation, and if you're going for a job afterwards they may think you got a degree from a university which they don't really like"*
>
> (School **B** Respondent)

This student is understood as claiming that the reputation of the course within the industry is an important consideration. In fact, the Student respondents from all four schools continued to associate reputation with graduate employment arguing:

> *"employers can take one look at an application and although it's they shouldn't be like this but it's like it can depend massively on the university you went to so if someone went to like Oxford and another person went to Hull then you kind of know who's going to get the job"*
>
> (School **D** Respondent)

However, the stakeholders believed the reputation of the course is not a primary factor because students put greater emphasis on factors that will impact on their course of study, such as quality and the availability of facilities, stating:

> *"I think course and course location and living accommodation and those sorts of things are the drivers for them not reputation"*
>
> (Stakeholder **Five – Head teacher**)

Despite this view, the students still argued reputation is an important factor within the decision making process. In fact, entry requirements were also seen as a measure of reputation, with the Student respondents from all four cohorts

perceiving a course to have a better reputation the higher the expected entry requirements. Interestingly, on further probing into how reputation could also be measured, the students quickly mentioned a divide existing between courses offered at pre-1992 and post-1992 universities, stating:

> *"no disrespect right if you look at like Leeds Met compared to Leeds, Leeds Met are better at Sport (laughing) but like the entry requirements to do the same subject are so much lower that you really have to take into consideration the type of people who like, like the quality of, the quality of the course like which you can like take on into life for jobs"*
>
> (School **C** Respondent).

In fact, this was a common theme amongst all the Student respondents. Therefore this suggests that university heritage and a required number of entry points are at the centre of how prospective students measure reputation. Despite this claim amongst the Student respondents, none of the students perceived league tables as being a symbol of reputation, relying more on word of mouth amongst their peers.

Despite the stakeholders not perceiving the students to focus heavily upon reputation, they were sympathetic to the divide between pre- and post-1992 universities, stating:

> *"I would love I'd love us to get to the point when I'm an old lady when people will no longer have this perception of pre and post they are just universities"*
>
> (Stakeholder **One – Admissions officer**)

suggesting subjective influence amongst parents to impact on the decision making process. The same stakeholder further believes the prospects of the region, including chances of graduate employment to be of a greater influence than the tradition of the university. However Stakeholder (**Three – Student recruitment officer**) still describes the reputation of a prospective course to be underpinned by the sector divide.

5.2.8 Safety

In terms of safety it soon became apparent that a sense of ambiguity was felt amongst all the Student respondents. Further probing revealed safety wasn't considered as a major influence on the decision making process, with Student respondents claiming:

> *"I just consider that all universities should be safe anyway"*
>
> (School **D** Respondent)

In fact the Student respondents claimed that safety would only become a factor once enrolled on their undergraduate degree programmes. A key factor amongst the Student respondents was the influence of the media. Each focus group connected the city of 'Nottingham' to the attribute of safety, justifying their claims from stories they had heard on the news. However, the main focus of safety was distributed through word of mouth. One respondent claimed:

> *"when we went on the Manchester open day someone said em, someone said that they like, there'd been murders and rapes within the first week of fresher's week, like two of them so I was a bit put off"*
>
> (School **C** Respondent)

However one female respondent who was considering Nottingham argued:

> *"I consider it with Nottingham because I think Nottingham's like my second choice, em but I mainly wasn't worried about it because I've got a friend there who says a lot of it is on campus, so on campus is not going to be hopefully a lot of gun crime"*
>
> (School **C** Respondent)

This word of mouth can act as a positive and negative influence on deciding which course to attend. With reference to the stakeholder respondents, they believed safety to be more of a concern with the parents, stating:

> *"they want to make sure that the place has got CCTV they want burglaries em they want to make sure that em, its generally safe enough for them to walk around"*
>
> (Stakeholder **Three – Student recruitment officer**)

suggesting the parents to be quite structured when considering their child's safety. However, stakeholder (**Two - Parent**) confessed to never considering safety within the search process, admitting to only hearing about the level of security when attending a university open day.

Despite safety concerns not being classed as a core factor in the decision making process, both student and stakeholder respondents argued that they wanted to know students could feel secure when living in their accommodation. They placed greater emphasis on ensuring personal possessions were kept secure.

5.2.9 Type of course

In terms of the type of course, the Student respondents classed the length of the course as being unimportant. The Student respondents considered university as a one-off opportunity in which they wanted to study a course they enjoyed, regardless of the length of programme.

However, one respondent from School **B** considered the length of time as having a huge influence when selecting a prospective course, stating:

> *"I think if you're doing a longer course then you could try something like a sandwich course"*
>
> (School **B** Respondent)

suggesting breaking up the period of study undertaking a year of paid employment. Indeed, respondents from School **B** shared this view, implying there was a sense of urgency to start work as soon as possible.

However, in terms of Student respondents from Schools **A**, **C** and **D** they admitted not focusing on the length of study, claiming if it's the right course you want to study then students shouldn't be put off by the length of time they spend at university. In terms of stakeholders, Stakeholder (**One – Admissions officer**) argued that the vast majority of students only really start to consider the length of course after they have examined the structure of the course. Thus the structure

and length of course appear to be mutually exclusive. Interestingly, the remaining stakeholders suggest the vast proportion of students only want a 3 year full time degree programme. However Stakeholder (**Five – Head teacher**) believed that the course length may be extended if a student finds a course that offers the right style of learning, claiming:

> *"The kids are very used to getting quite a bespoke package but also an assessment regime that suits them so that you know they know that they want to do lots of coursework type you know and gain marks that way and do that sort of thing rather than end module tests or examinations"*
>
> (Stakeholder **Five – Head teacher**)

This suggests students select a type of course through which they believe they can best achieve success. Stakeholder (**Two - Parent**) supports this, claiming:

> *"it was important to find a course that would suit him that he could succeed at enjoy erm because the last thing he want to experience is failure"*
>
> (Stakeholder **Two - Parent**)

In terms of the syllabus structure, all of the Student respondents claimed this to be a primary factor when selecting a course. In fact every group of respondents described how they had short listed courses that fulfilled their interest by enabling them to choose parts of the syllabus they most enjoyed, claiming:

> *"I was looking for a very specific type of course at first I mean was trying to find things that had the exact sort of... and then when I knew like where I could find that kind of course I kind of then started looking at what was in the modules"*
>
> (School **D** Respondent)

This suggests students place greater emphasis selecting a course that was very personal, regardless of the length of study. In fact, the Student respondents expressed no preference when talking about the differing length of programmes that existed within the group suggesting students have very individual needs when selecting their undergraduate programme.

Given the importance of the structure of the course, Student respondents were asked to provide further detail on the type of courses they were interested in studying. Despite this research not being subject specific, this allowed the structure of undergraduate courses to be explored. Students from School **A** reported they were interested in 3 year full time courses with two of the respondents interested in 4 year theory based courses. School **B** respondents admitted to be more interested in standard 3 year courses, although a number of respondents had considered a 3 year course with 1 year in industry. As previously mentioned, students from School **C** who were currently attending independent secondary school education were all considering applying to pre-1992 universities and on average applying for courses that were traditionally theory based. Respondents from School **C** were on average more interested in applying to 4 year and 5 year long courses such as medicine and dentistry. Finally, a number of School **D** respondents were more interested in applying for foundation degrees before starting their degree courses and were, therefore, interested in 3 to 4 year long theory based courses.

5.3 Summary of themes

The 'Noting, Patterns and Themes' technique (as described in Section 5.1.2) draws conclusions from the data discussed in Section 5.2 by examining (1) whether the attributes are considered to influence students' choice when applying for a degree course and (2) if the attribute is considered to influence student choice then what is the most commonly reported theme (Miles and Huberman, 1994). This approach to analysing the data findings from this analysis shows the attributes of entry requirements, facilities, location, price, quality of teaching and type of course are all to be considered to influence student choice of degree course.

The attribute entry requirement was found to influence prospective students' decisions to choose an undergraduate degree course. Despite its association with representing quality of a programme the main theme from this attribute surrounded the number of UCAS points needed to gain admission onto an undergraduate degree course. Closer inspection of the interview data finds courses between 180 and 360 UCAS points to be most commonly considered. Another attribute found to have a positive influence on choice of degree course was facilities. Nevertheless, the findings from the data revealed the 'quality' and 'price' of first year accommodation to be as equally important themes for this attribute. The levels associated with quality of rented accommodation suggest access to en suite facilities, internet access, cleanliness and price are all considered to influence student choice. One theme that was rejected was internet access; however, access to Wi-Fi was considered important, suggesting most students own their own computer. The price was also of clear importance to prospective students, with students willing to pay more for better quality accommodation (further information on the price of accommodation is presented in Section 5.3.1).

Section 5.2.4 acknowledged the importance location has on student choice of course. Student and stakeholder respondents reported the location of the course as a major influence on student decision making with only 5 out of the 28 Student respondents wanting to live at home. Interestingly, all respondents opted for a city based course describing campus based courses as boring. However, the major theme taken from this attribute was the distance of the course from the students' family home. It is also worth noting that respondents measured distance from home in minutes not miles with the average travelling time ranging between 45 and 180 minutes. Despite the train being a popular method of transport, on reflection, the specific mode of transport should have been clarified. However, the limitations and lessons learnt from this study are discussed in Chapter 7.

When choosing an undergraduate degree course, there is little doubt that quality of teaching has an influence on the student decision making process. Student respondents admitted quality of teaching to be extremely important in the lead up to choosing an undergraduate programme. Despite its importance, identifying a main theme was extremely difficult. Even on this basis it felt important not to dismiss the attribute as the findings clearly showed quality of teaching to be a decision making factor when choosing a degree course. As a result the decision was taken to use secondary data to develop the levels for the attribute, an approach strongly supported by experienced DCE academics. As previously reported in Section 3.1.1 in an attempt to define quality of teaching Sastry and Bekhradnia (2007) suggested the amount of contact time to be a proxy of quantifying quality. Associated values ranged between 9 and 36 hours per week. These were tested as part of the pilot process (as dealt with in Section 4.2.3) and were found to be an appropriate proxy to quality of teaching.

Type of course was also found to have an influence on student choice of course. The main theme to emerge from this attribute was course structure. Both student and stakeholder respondents described how great importance was associated with the structure of the course when thinking about attending university. The reported levels for this theme were analysed across all four schools, revealing prospective students to be interested in applying to degree courses that include standard 3 year courses, 3 year courses that include one year on placement, 4 year and 5 year theory based courses.

The final attribute found to influence the student choice of degree course was price. At first price wasn't seen to be an influence but further analysis of the interview data revealed price to be particularly important for Student respondents enrolled in state education. Nevertheless, Lancsar and Louviere (2008, p. 667) remind us that: "*DCEs may not include every attribute important to every respondent, but it is important to capture attributes salient to the majority to avoid*

respondents making inferences about omitted attributes", implying attributes incorporated within a DCE are those that tend to have a significant impact on the majority of student and stakeholder respondents. The main theme identified from this data surrounded how much students would pay towards the cost of their course. A broad range of respondents was chosen to take part in the interviews in order to maximise the possible levels. The importance of this is again highlighted by Lancsar and Louviere (2008, p. 667), who state: *"Level range is particularly important for the price attribute if it is to be used to calculate implicit prices of attributes".* Given this, a mean was taken including both student and stakeholder respondents. Findings from these show students who receive financial assistance in the form of the Widen Participation scheme on average won't pay the minimum for tuition; however, students from middle ground and independent schools were willing to pay as much as £8,000 per year for tuition. However Hensher *et al.* (2005) recommend a broad range of attribute levels should be included in a DCE to avoid the risk that respondents reject completing the survey due to there being too little difference between the levels. Consequently the decision was taken to raise the level in line with market reports that the government may increase fees to £12,500 per year (Paton, 2009a and Paton, 2009b). It is important to note this decision was also recommended by leading academics experienced in DCE research.

The attributes 'Graduate Employment, Reputation and Safety' were not found to influence respondent choice of course. The main reason for not including them in the DCE is that no underlying theme could be taken from the data. As a result these three attributes were not included in the DCE. It is worth noting that despite reputation having an influence on Student respondents, the emerging theme revealed the number of UCAS points to be the measure of a course's reputation. However, the number of entry requirements had already been

identified as part of another attribute, ‘Entry requirements’. Therefore the decision was taken not to include it in order to avoid duplication and confusion.

5.3.1 The way forward ~ the attributes and levels

Since 6 attributes had been found to influence student course level decision making these will be included in the DCE. It is important to note that although some of the information collected from these interviews, was already available though secondary sources, to date there was no information on the levels (values) of these attributes. Consequently advice was also taken from experienced DCE researchers that interviews had to be conducted and that the existing published research could not be used on its own to construct a DCE efficiently.

Given the two themes were discovered for the attribute facilities along with the objective nature of this study, a logical solution was to examine both quality and price of first year living accommodation. In this case a second smaller DCE was developed (Section 4.2.2 dealt with how this was constructed) in order to estimate the influence of student choice on first year living accommodation. This contained only 8 choices sets and was positioned after the main DCE. Therefore, the survey instrument can be split into three sections. Section **One** of the survey will examine the attribute along with students’ reservation price when choosing an undergraduate degree course using a multinomial design. As discussed in Section 4.2.2 multinomial designs can be recognised as allowing respondents the opportunity to select one of three choices where one option is more commonly classed as an opt-out (Louviere *et al.* 2000). This was important as selecting a degree course is not a forced choice and respondents may choose to find employment if there is not a course they consider studying. Figure 5.3 contains an adapted version of Hossler and Gallagher’s (1987) student choice model. This shows the attributes and level to be used within Section **One** of the survey instrument to measure student choice of course. On the other hand, Section **Two**

of the survey (also based on Hossler and Gallagher's 1987 model) uses a smaller binary design to examine the attributes and respondents' reservation price for first year rented accommodation. As previously discussed in Section 4.2.2 a binary design offers only two choice options (Street and Burgess, 2007). The decision was taken to use a binary design as respondents either rent or don't rent university accommodation. Figure 5.4 contains an outline of the core attributes and levels to be used within Section **Two of** the survey instrument. Finally, Section **Three** will be used to gather demographic information about each of the respondents.

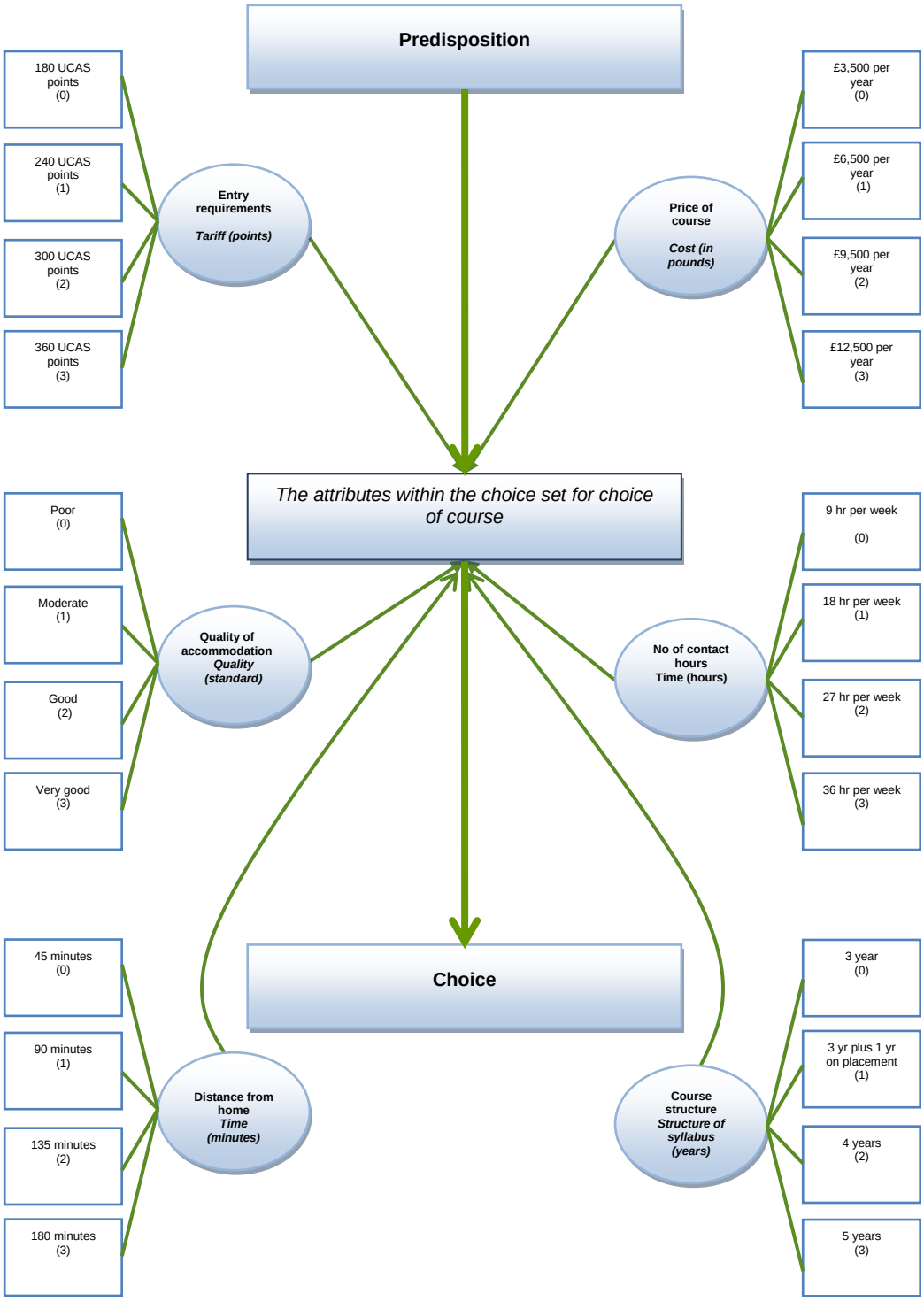


Figure 5.3: The six attributes and four levels included within the multinomial design - adapted from Hossler and Gallagher, (1987, p. 208) and contextualised for this study

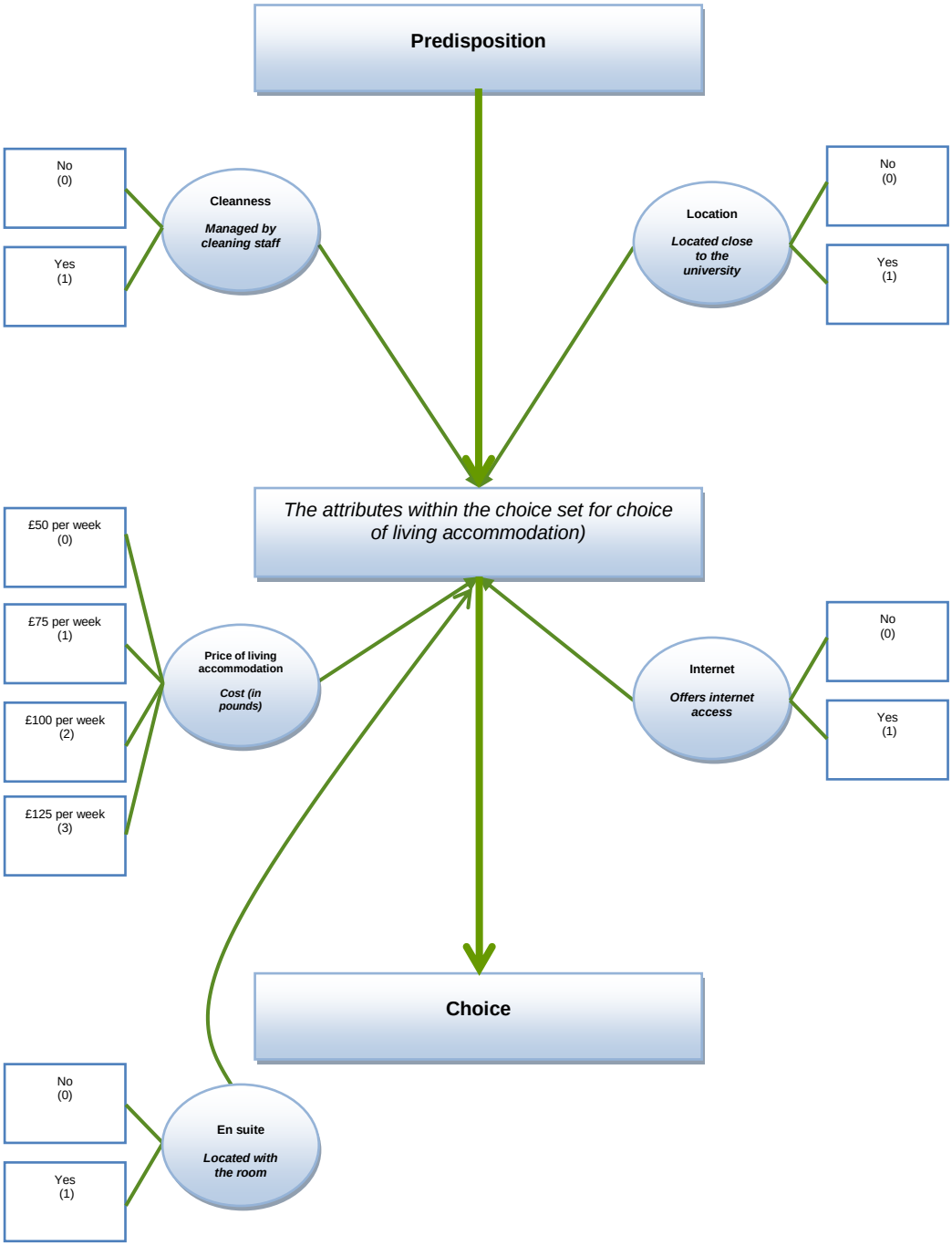


Figure 5.4: The four attributes each with two levels and one attribute with four levels included within the binary design - adapted from Hossler and Gallagher, (1987, p. 208) and contextualised for this study

5.4 Chapter summary

This chapter aimed specifically to critically evaluate the findings taken from Stage 1 of the primary research method in order for the attributes and levels required for the DCE to be identified. In fulfilling this aim this chapter has discussed the key themes drawn from the qualitative data. By administering focus group discussions and face-to-face interviews six attributes have been found to impact on the decision for full-time undergraduate degrees. It was also found that respondents ascribe preference to both the ‘quality and price’ of first year living accommodation. In order to capture the significance of both the variables the decision was taken to construct two DCEs in order to test precisely the attributes that ascribe the highest proportion of utility. Chapter Six will provide the findings from administering the DCE survey.

Chapter Six

Data analysis: Discrete choice experiment

6.0 Introduction

The aim of this chapter is to report on the statistical analysis (as discussed in Stage 5 in Chapter 4) of the findings taken from the discrete choice experiments (DCE), in order to provide an insight into the student preferences and reservation price estimates for the attributes and levels identified within the literature and validated within Stage 1 of the method. Initially, the construction of the DCE is revisited. The demographic data is then broken down and discussed. Attention then turns towards Section **One** of the survey. The approach to analysing the data follows guidance from Gerard *et al.* (2008) and Ryan *et al.* (2008b) in which seven steps are presented. First, the regression analysis is presented. From here the direction of the coefficients are interpreted before estimating the predicted probabilities. Following, this the respondents' reservation price for the attributes that make a full-time undergraduate degree course are estimated. The overall goodness-of-fit is examined before the analysis of Section **One** finishes with an examination of the odd ratios. The focus then turns towards the smaller DCE located within Section **Two** of the survey instrument. Similarly, results from the regression analysis are presented before examining the direction of the coefficients. Respondents' reservation price is calculated for renting first year living accommodation before the goodness-of-fit is examined. The chapter concludes with an examination of the odds ratio.

6.1 Revisiting how the survey instrument was developed

The development of the survey can be split into three main areas: constructing the survey, survey design and logistic regression analysis (as shown in Figure 4.1). These areas are shown in Figure 6.1.

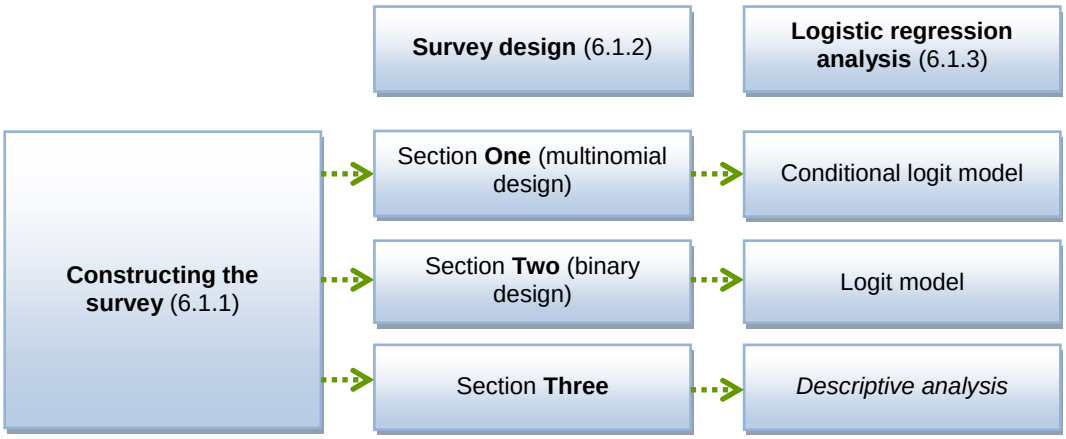


Figure 6.1: Constructing, designing and analysing the survey data

6.1.1 Constructing the survey

Since very little existing research has been conducted into the attributes and levels that influence students' choice of degree course, the attributes were validated and their levels discovered using focus group and face-to-face interviews. As discussed in Section 5.2.2 the attribute 'facilities' was found to influence respondent choice for both price and quality of first year accommodation. Given the nature of this study, both levels were examined by constructing a survey incorporating two DCEs. Section **One** of the survey contains the attributes that influence respondent choice of degree course and includes quality of accommodation and is based upon a multinomial design meaning respondents had the opportunity to opt out of answering any of the 32 choice sets (questions). This was developed using a fixed orthogonal main effects plan (the same number of levels are attached to each of the attributes as discussed in Section 4.2.2) taken from Sloan's (2009) web catalogue ensuring that there was no correlation (also detailed in Section 4.2.2) between the

attributes. This fixed orthogonal main effects plan consisted of 32 choice sets, 9 attributes each with 4 levels. Despite the option of including 9 attributes, only 6 attributes were included in the survey further removing the need for three of the columns from the original design (Louviere *et al.* 2000). This is shown visually in G with the rejected columns 8 to 10 highlighted in red. This left 32 choice sets at 6 attributes, each with 4 levels. The design properties 'level balance' and 'minimal overlap' were then considered (Huber and Zwerina, 1996 and Lancsar and Louviere 2008). Level balance was assessed by checking the frequency of the levels for each of the attributes (as shown in H). Minimal overlap was evaluated by ensuring the same level wasn't used twice in the same choice set (as shown in N). As referred to in Section 4.2.2 the pairing of the choice sets was constructed following extant published research by Street *et al.* (2005) and Street and Burgess (2007), which suggest the L^{MA} (L=level, M=alternative of A=attribute) method to provide a flexible and accurate approach to developing choice sets for main effect plans. The L^{MA} method can be described as adding one to each of the attributes in the design in order to create a second pair of choice sets (detail of this procedure is shown in I for columns 9 to 14 listed under Course B). In essence, for each combination of levels the first six attributes were used to represent the first alternative (Course A) in the choice set with the final six attributes being used to create the second alternative (Course B) in the choice set. The levels for the second alternative (Course B) were created by adding one to each of the original levels (Street *et al.* 2005). An example of the L^{MA} method once completed for the attributes in Section **One** is shown in J.

Section **Two** of the survey contains the attributes that influence respondent price of accommodation and is based upon a binary design (as previously discussed in Section 3.6.1). This meant respondents faced a dichotomous choice; for example, "would you rent accommodation scenario one: yes/no" (Amaya-Amaya *et al.* 2008). Again an orthogonal main effects plan was taken from Sloan's

(2009) web catalogue to ensure there was no correlation between the attributes. However, it is important to note that this was a mixed orthogonal design (as discussed in Section 4.2.2) as one of the attributes incorporated in the experiment had a different number of levels. Nevertheless, an exact design was found, further rejecting the need to find a larger design leaving 8 choice sets with 4 attributes at 2 levels and 1 attribute with 4 levels. Attention then turned towards assessing the properties of the design; this included considering level balance and minimal overlap. Evaluation of these properties confirmed an equal number of levels to represent each attribute with no level being repeated for the same attribute in a choice set (as shown in L). Traditionally, when constructing a binary design, the method of pairing choice sets is not required. This is due to pair comparison not being used in binary designs. However, as with the multinomial design, choice sets were constructed manually following the L^{MA} method, as discussed in Section 4.2.2 (Street *et al.* 2005 and Street and Burgess 2007). This ensured orthogonality and choice sets were random. The process of conducting the L^{MA} method for the binary design is shown in M. This involved adding one to the first five attributes in the design to produce the choice set. Detail of this procedure is shown in columns 9 to 13.

6.1.2 Survey design

Each of the two designs made up the first and second sections of the survey, with the multinomial design being labelled Section **One** and the binary design being labelled Section **Two**. A third section was added in order to collect respondents' personal information. This made up Section **Three** (a copy of the survey instrument is found in N). Together each of the three sections was presented in an A4 booklet (Dillman, 2008) and took approximately 10 to 15 minutes for the prospective students to complete.

6.1.3 Logistic regression analysis

As previously discussed in Section 4.2.5.1 statistical analysis is a well established approach for evaluating data collected through a survey instrument. Statistical analysis can be described as a scientific approach to estimating individuals' indirect utility (as discussed in Section 4.2.6) for the alternatives contained within an experiment. Nevertheless, the decision to incorporate discrete choice theory to estimate course level decision making meant part of the respondents' utility (as discussed in Section 2.3.1) for an alternative is random and, therefore, unobservable. Consequently, only the probability that an individual (*n*) chooses alternative (*i*) can be computed, thus meaning the exact option individual (*n*) will choose cannot be discovered. Louviere *et al.* (2000) argue that when analysing choices that contain a random component collected as part of a DCE, probability models provide a powerful way to access the relationship between the dependent variable and one or more independent variables (as displayed in Table 6.3 further on in this chapter). In terms of the data collected from Section **One** of the survey, probability models can be derived using either 'Normal' distributed or 'Gumbel' distributed techniques (for a definition of these see terms see the glossary of terms). Section 4.2.5.1 discussed how Gumbel distributed probability models are preferred due to the fact Normal models have a tendency to overestimate the data (McFadden, 1974; McFadden, 1986 and Myers and Mullet, 2003). Indeed, Train (2003, p. 101) summarises the debate by stating: *"Normal distributions are inappropriate and can lead to perverse forecasts"*. Section 5.3 also recalls a second smaller DCE was developed to examine the effect of price on respondent choice of rented accommodation. The decision to construct a second DCE was taken in line with the highly pragmatic nature of the research and after obtaining advice from leading DCE researchers and made up Section **Two** of the survey. This involved using a logit model to analyse respondents' preference based on a binary design.

A logit model was chosen because of its assumption regarding the density function (as discussed in Section 4.2.5.4).

For both Section **One** and **Two** of the survey the constant can be described as the mean distribution of unobservable utility which in essence is the general underlying preference towards an alternative (This is discussed in Section 4.2.5.4). One issue that should be noted by the reader is the size of the constant is in no way indicative of the real price that a respondent would be willing to pay. It is a measure of the demand to pay. It is only a measure of the demand for an English University education. The DCE is translating respondents' preference for individual attributes into a monetary value. The constant comes from measuring the chosen probability model.

6.2 Seven steps of analysis

The importance surrounding the seven steps of data analysis was first reported in Section 3.6.6 and later adapted in Section 4.2.5.6. The seven steps represent a logical order to evaluating and presenting DCE data (Ryan *et al.* 2008b). The seven steps of data analysis for Section **One** (incorporating the conditional logit model - as described in Section 4.2.5.2) and the six steps for Section **Two** (incorporating the logit model – as described in Section 4.2.5.4) are shown in chronological order on the following page. Nevertheless De Vaus (2002) describes how examining respondent demographic information can provide initial detail about the respondents and can provide a logical place to begin when analysing statistical data.

6.3 Step 1 ~ Demographic information for Sections One and Two

Stage 5 – **Statistical analysis**

(Sections **One and Two)**

Step 1. **Demographic information**
Step 2. The significance (& joint significance) of the attributes
Step 3. Direction of effect for the significant attributes
Step 4. Probability of take-up *(only for the conditional logit*)
Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

6.3.1 Response rate

Two hundred and thirty respondents completed Sections **One** and **Two** of the survey. A breakdown for the completed number of choice sets (as displayed in N) is shown in Table 6.1.

Section **One**		Section **Two**	
Number of respondents (N=230)	Number of completed choices (out of 32)	Number of respondents (N=230)	Number of completed choices (out of 8)
212	32	213	8
1	6	**17**	**None**
2	29		
1	30		
2	31		
12	**none**		
N=218		N=213	

Table 6.1: The number of respondents who completed Section One and Two of the survey

In Sections **One** and **Two** all partially completed surveys were used for the statistical analysis. This is because partially completed responses still contribute towards estimating aggregate regression data (Hensher *et al.* 2005). Nevertheless, 12 respondents failed to complete any of the choices in Section **One** along with a further 17 respondents in Section **Two**. The number of respondents providing responses for the regression analysis for Section **One** of

the survey was 218, resulting in 20,820 observations and the number of respondents providing responses for the Section **Two** was 213, resulting in 1704 observations, showing slightly less respondents to have completed Section **Two** of the survey in comparison to Section **One**. With hindsight, asking respondents to complete the survey in tutorial time might have prevented them from having enough time to finish the survey. This issue, along with other limitations, is reflected upon in Chapter 7.

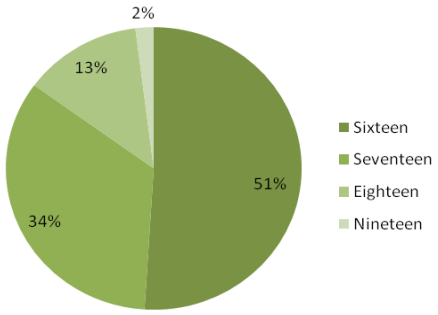
From a total population of 746 sixth form students 218 students at this point in time expressed an interest in enrolling at an English university on a full-time undergraduate degree programme. In other words a census population of 218 student respondents was discovered from the two North-east based secondary schools. In fact, it is worth remembering, as reported in Section 4.2.4 in the only other previous study to focus on respondent choice for English universities that required respondents to evaluate attributes contained within choice sets (as shown in N), Moogan *et al.* (2001) only managed to secure as few as 32 respondents. This, therefore, suggests that the census gathered from the two schools total sixth form population acknowledges this research project to have achieved an above average response rate.

A breakdown of respondents' demographic information is displayed in Appendix (W), however the most distinguishing findings are displayed on the following page in Table 6.2.

Section **One**

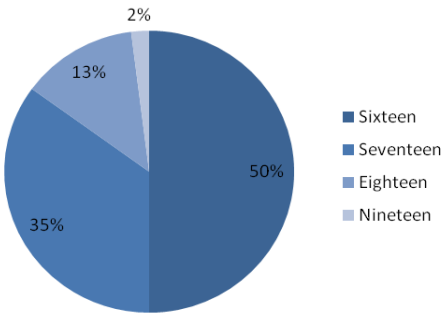
Section **Two**

C



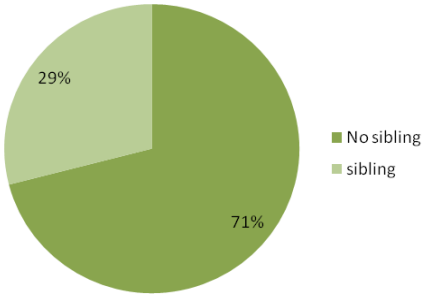
Age

D



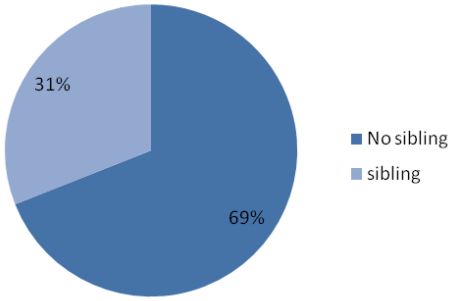
Age

G



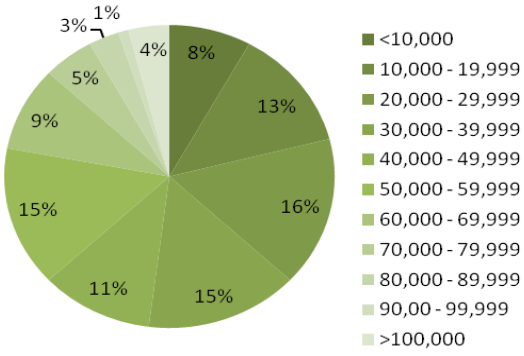
No of siblings

H



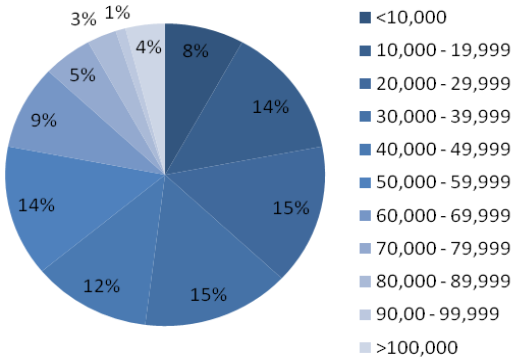
No of siblings

I



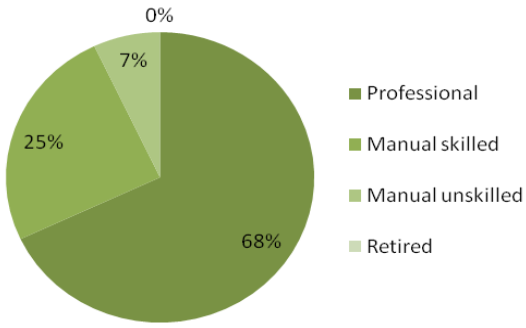
Household income

J



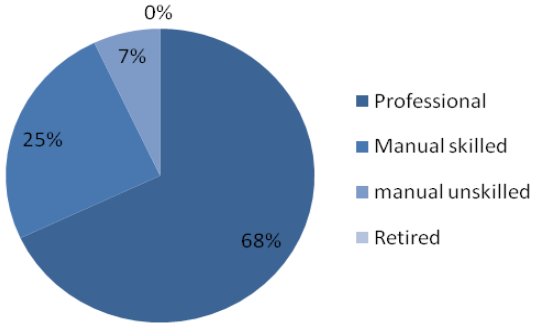
Household income

K



Parent/Guardian occupation

L

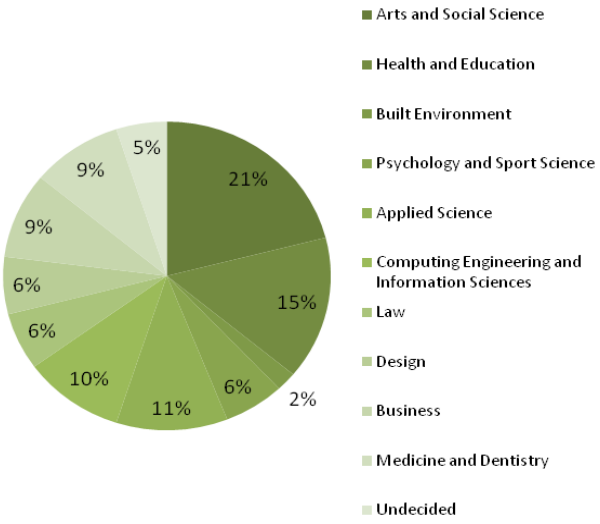


Parent/Guardian occupation

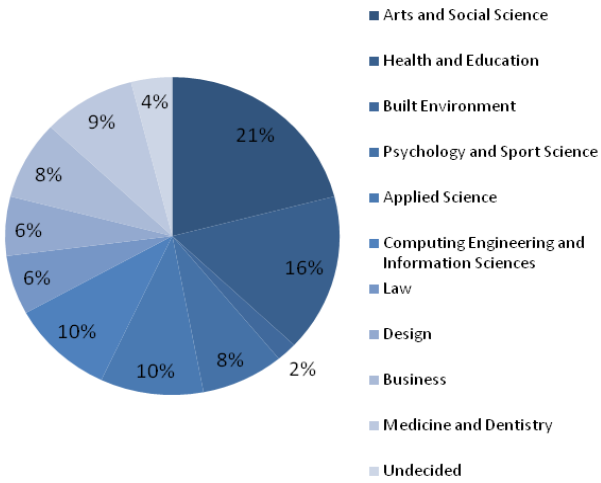
Section **One**

Section **Two**

M



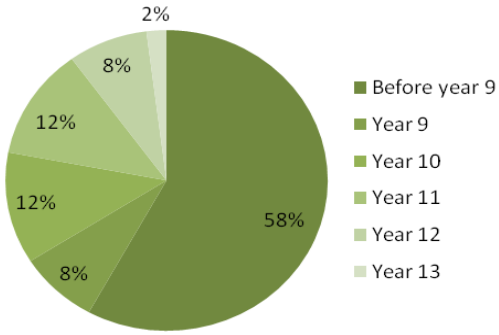
N



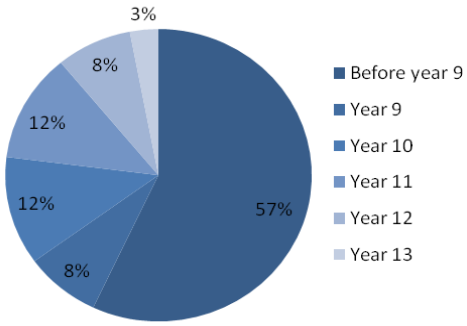
Subject area interested in studying

Subject area interested in studying

O



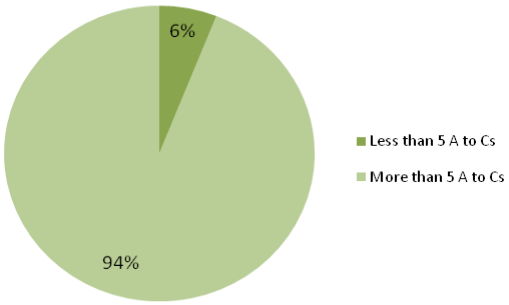
P



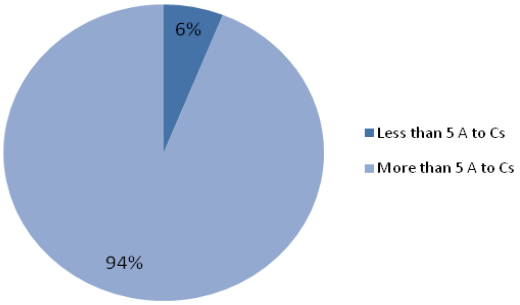
First interested in attending university

First interested in attending university

S



T



Level of qualifications

Level of qualifications

Table 6.2: A breakdown of demographics of response information

The findings from this research show the majority of respondents are 16 years of age (as shown in graphs C and D in Table 6.2), suggesting the highest portion of respondents are enrolled in Year 12. With hindsight, it might have been better to focus only on Year 13 students who were in the process of making their course level decisions. However, in the only other study to have used a DCE to investigate student choice, Holdsworth and Nind (2005) targeted both Year 12 and 13 respondents, thus allowing a large number of respondents to be targeted. Graphs G and H in Table 6.2 show between 69% and 71% of respondents to be the first child in their family to be interested in applying to an English university. This suggests the majority of the respondents have little experience of the university application process and what it is like to attend an English university.

Other information collected from Section **Three** of the survey shows respondents to come from a wide range of income groups. However, graphs I and J in Table 6.2 show that the majority of respondents indicated that their household income was less than £60,000 per year. In fact, most household income fell between £20,000 to £40,000 per year; that is, above the average for the region (www.statistics.gov.uk). Therefore, it was not surprising that the majority of respondents (as shown in graphs K and L in Table 6.2) reported their parents/guardians to be employed in professional occupations.

The findings from this survey also showed that courses reported as being popular included, History and Drama, Sport Science and Pure Sciences, such as Chemistry suggesting non-vocational courses to be popular among prospective respondents. On the other hand, only 2% of respondents (as shown in graphs M and N in Table 6.2) reported being interested in applying for a course in the building and construction industry. One explanation for this low number could be linked with today's economic environment and overall decline in the construction industry. Although individual courses were not part of this experiment, the possibility of subject level research is discussed further in Chapter 7.

Graphs O and P in Table 6.2 clearly show the majority of respondents wanted to attend university before Year 9. These results suggest that respondents from a very early age want to go to university and, therefore, have strong aspirations and find attending university highly desirable. Finally, findings displayed in graphs S and T in Table 6.2 show that 6% of respondents have fewer standard qualifications. In post 16 education the Vocational Certificate of Education allows respondents to spend an additional year in Sixth Form in order to secure more standard qualifications before starting A-levels. This may explain the reason why 2% (as shown in graphs C and D in Table 6.2) of respondents indicated they were 19 years of age. It is also worth noting that the decision was taken not to analyse the data with the respondents' personal information. Cross referencing respondents' personal information with the regression data is beyond the scope of this study. This is discussed in more detail in Section 8.4.2.

An initial challenge in the presentation of the data was reporting the results from Sections **One** and **Two** of the questionnaire. Therefore, the decision was taken to present the remainder of the data separately. The intention of presenting the data in this way reflects the different models of analysis. Therefore it seems appropriate first to look at the regression analysis for the multinomial design first in Section **One** of the survey.

6.3.2 <u>Section One</u>: Step 2 ~ The significance of the attributes

In this section Step 2 is now considered and examines the attributes included in Section **One** of the survey.

Stage 5 - **Statistical analysis**

(Section **One)**

Based on a **conditional logit model** using regression analysis

Step 1. Demographic data
Step 2. The significance (& joint significance) of the attributes
Step 3. Direction of effect for the significant attributes
Step 4. Probability of take-up
Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

The attributes (as shown in Table 6.3) are listed in column 1 with their levels of associated value in column 2. Chapter 5 dealt with how these were developed. The conditional logit model as discussed in Section 4.2.5.4 was run using Stata and data generated. The attributes are considered statistically significant at a 95% confidence level. Statistical significance was checked using a Wald test (as discussed in Section 4.2.5.3). The results from this test can be seen in column 4 in Table 6.3 labelled P>|Z|. It is worth noting that for the attributes that do not have a significant influence on the choice outcome the statistical weight attached to that particular variable would be greater than 0.05. From this it is possible to see that attributes that contain significant levels are 'quality of accommodation', 'distance from home', 'contact time', 'course structure' and 'cost'. It is interesting to note that a large number of the significance variables in Table 6.3 are reported as 0.000. In a recent study examining the importance of using the Wald test, Street and Burgess (2007) describe how large sample sizes (such as those over 200) can slightly overstate the numerical value of the variables. The writers go on to state that although there is no doubt that the variables are significant many of the results can be reported as 0.000.

Column 1	Column 2	Column 3	Column 4
Variable	**Level**	**Coefficient**	**P>|Z| *(outcome from the Wald test)***
NO OF POINTS (β_3)	240 points	.0392828	0.238
	300 points	.0269189	0.335
	360 points	.0528272	0.203
QUALITY OF ACCOMMODATION (β_6)	Moderate	-.139797	0.000**
	Good	.3134722	0.000**
	Very good	.5761973	0.000**
DISTANCE FROM HOME (β_9)	90 minutes	.0708733	0.007
	135 minutes	-.0185052	0.531
	180 minutes	-.0826214	0.005**
CONTACT TIME (β_{12})	18 hours	-.0346488	0.178
	27 hours	.1254976	0.000**
	36 hours	.01906	0.576
COURSE STRUCTURE (β_{15})	4 years including one year on placement	-.0351255	0.223
	4 year theory based	.2502111	0.000**
	5 year theory based	-.2434121	0.000**
COST ($\beta_£$)	£0 to £12,500 *(Continuous variable)*	-.0000695	0.000**
CONSTANT (β_0)		2.098522	0.000

**significant at a 95% confidence level/ separate Wald Test for joint significance 0.0000

Table 6.3: The significance of the attributes from the multinomial design

'Quality of accommodation' was found to have a significant influence on respondent choice of course at every level. This clearly shows that the quality of first year rented accommodation for 'Moderate, Good and Very Good' accommodation (as defined in Appendix N) are significant predictors of respondent choice of course. Another attribute found to have a significant influence on respondent choice of course was distance from home. Yet the attribute distance from home only exhibited one significant effect; namely, for the level 180 minutes from the respondents' family home. Closer inspection of the data indicates that any course located more than 180 minutes from the respondents' family home would have a negative influence on respondent choice. However, it is important to note that prospective students living in other parts of

the country may have a different willingness to travel time compared to students originating from the North East of England.

Section 5.3 discussed how the number of contact hours was used as a proxy for measuring quality of teaching. The attribute ‘contact hours’ only exhibited one significant effect; namely, for the level 27 hours teaching per week - therefore suggesting respondents clearly liked 27 hours per week. The attribute ‘length of course’ exhibited significant values for levels 4 year and 5 year theory based courses. Thus, acknowledging 3 year theory based and 4 year courses including one year on placement not to have a significant influence on student choice. This ties in with other research that a placement only becomes of increasing importance once students are at the university (Foskett and Hemsley-Brown, 2001).

The attribute ‘price’ was found to have a significant influence on respondent choice of course. However, this could have been expected as the price of tuition rises, respondents are more likely to select a cheaper degree course. It was also found for the attribute entry requirements that the number of UCAS points has a negative influence on respondents’ choice of degree course. Indeed, the number of points was also found to have a negative influence on respondent preference at every level. This result will be discussed in Chapter 7.

Finally, the joint significance of the attributes was tested. This involved using a separate Wald test (as discussed in Section 4.3.1 and shown as the bottom of Table 6.3) for attributes found to be statistically significant. From this it is possible to see that there is no relationship between the attributes.

6.3.3 <u>Section One:</u> Step 3 ~ Direction of effect for the significant attributes

Stage 5 - **Statistical analysis**

(Section **One)**

Based on **a conditional logit model** using regression analysis

Step 1. Demographic data
Step 2. The significance (& joint significance) of the attributes
Step 3. Direction of effect for the significant attributes
Step 4. Probability of take-up
Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

Once the significant attributes have been identified the direction of effects could be calculated. The focus of this step is to explore the effect (as discussed in 4.3.1) attribute levels have on respondents' utility towards a degree course. In this step we are looking at only the significant attribute levels, otherwise no meaningful estimates can be developed (Hensher *et al.* 2005). These attributes are shown in Table 6.4 (revised to exclude non-significant attributes and levels and to also consider the joint significance of the values). Direction of effect is looking at column 3 coefficient values and are those moving in the expected direction. Thus, allowing indirect utility to be estimated.

Column 1	Column 2	Column 3	Column 4
Variable	**Level**	**Coefficient (Direction of effect)**	**P>|Z| (Outcome from the Wald test)**
QUALITY OF ACCOMMODATION (β_6)	Moderate	-.139797	0.000**
	Good	.3134722	0.000**
	Very good	.5761973	0.000**
DISTANCE FROM HOME (β_9)	180 minutes	-.0826214	0.005**
CONTACT TIME (β_{12})	27 hours	.1254976	0.000**
COURSE STRUCTURE (β_{15})	4 year theory based	.2502111	0.000**
	5 year theory based	-.2434121	0.000**
COST ($\beta_£$)	£0 to £12,500 *(Continuous variable)*	-.0000695	0.000**
CONSTANT (β_q)		2.098522	0.000

**significant at a 95% confidence level /separate Wald Test for joint significance 0.0000

Table 6.4: The size of the coefficients for the attributes found to be statistically significant for Section One of the survey

A major theme which emerges from looking at these results is the utility associated with quality of living accommodation. For the attribute 'quality of accommodation' levels 'Moderate', 'Good' and 'Very Good' (as defined in Appendix N) were all found to be statistically significant predictors of respondent choice of course. Estimates that were expected further prove the model to be consistent with *a priori* expectations. In fact, the coefficient values of these levels show that respondents are more likely to choose accommodation that includes en suite facilities, high levels of cleanliness and a position very close to the university than rented accommodation that does not offer en suite facilities, is not clean and is located further away from the university campus. In other words, the above levels were all found to have a positive influence on respondent choice of course with respondents more likely to rent better quality accommodation.

The attribute 'distance from home' only displayed one significant effect, namely for the level 180 minutes. However, closer inspection of this estimate suggests that if the only course respondents could attend was located 180 minutes from

their family home this would have a negative impact on their decision to go to university. In other words, prospective students would look for alternative career opportunities such as apprenticeships or employment instead of attending university.

There is also evidence that for the attribute ‘contact time’ the level ’27 hours per week’ is the only level to exhibit a significant effect. Nevertheless, the parameter estimates for this level suggest that if respondents wanted to attend a degree course that only offered 27 hours contact time per week prospective students would still want to choose to attend that course, demonstrating 27 hours of contact time per week to have a positive impact on respondent choice of course.

In addition to this the attribute ‘course structure’ revealed the levels ‘4 year theory based’ and ‘5 year theory based’ to be statistically significant predictors of respondent choice, although closer inspection of these levels suggests respondents have different opinions about these two levels (this results will be discussed in Chapter 7). The coefficient estimates in the above table confirm that if respondents had to select a 4 year degree course then this length of programme would have a positive influence on student decision to choose that degree course. However, although five year courses were found to have a statistically significant influence on respondent choice of course, if the length of the course increased above 4 and 5 years, respondents would be less likely to choose that degree course in the future and might look for different universities that offer shorter programmes.

Another important finding from looking at the coefficient estimates for the choice of course was that the attribute ‘cost’ was found to be a statistically significant predictor of respondents’ choice of course. However, it is important to note that any increase in the fee price above £12,500 per year (as indicated in column 2) has a negative influence on respondent choice of degree course. In other words,

any increase in the price prospective students had to pay would mean they are less likely to attend university and more likely to find alternative career paths.

For the remaining attribute 'entry requirements' this was not found to have a statistically significant influence on respondent choice. Therefore, utility estimates were unable to be computed. However, the results from Table 6.4 show that high quality first year accommodation along with degree courses that offer 27 hours contact time per week spread over a 4 year programme have a positive influence on course level decision making.

6.3.4 Section One: Step 4 ~ Probability of take-up

Stage 5 - **Statistical analysis**

(Section **One)**

Based on a **conditional logit model** using regression analysis

Step 1. Demographic data
Step 2. The significance (& joint significance) of the attributes
Step 3. Direction of effect for the significant attributes
Step 4. Probability of take-up
Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

For this step, the probability of take-up is estimated using the attribute levels found to have a significant influence on student choice of course (as displayed in columns 1 and 2 in Table 6.4) and was calculated once the data had been collected. The importance of this procedure is outlined by Ryan *et al.* (2008b) who describe the test to provide the opportunity to compute the probability of uptake for a range of hypothetical undergraduate degree courses charged at different fee prices. It is no surprise that these hypothetical scenarios are based on proposed policy initiatives, simulating English universities charging anything

from £3,500 to £12,500 per year. The hypothetical scenarios are listed in Table 6.5 according to their price.

Label	Levels
$V_{£3500}$	Good quality of accommodation, located 180 minutes from the family home, providing 27 hours of contact time per week over a 4 year long course and pay £3500 per year
$V_{£6500}$	Good quality of accommodation, located 180 minutes from the family home, providing 27 hours of contact time per week over a 4 year long course and pay £6500 per year
$V_{£9500}$	Good quality of accommodation, located 180 minutes from the family home, providing 27 hours of contact time per week over a 4 year long course and pay £9500 per year
$V_{£12500}$	Good quality of accommodation, located 180 minutes from the family home, providing 27 hours of contact time per week over a 4 year long course and pay £12500 per year

Table 6.5: The four hypothetical degree courses simulating new changes in policy from the British government

As discussed in Section 4.3.1 before estimating the probability, respondents' indirect utility was calculated. This involved adding together the perimeter estimates for the attributes found to be statistically significant then multiplying the total by the cost of the course (e.g. £3500 or 3500). The indirect utility for these four courses is shown below in Figure 6.2.

$V_{£3500}$ = .3134722 + (-.0826214) + (.1254976) + (.2502111) + (-.0000695x3500)

= 0.3633095

$V_{£6500}$ = .3134722 + (-.0826214) + (.1254976) + (.2502111) + (-.0000695x6500)

= 0.1548094

$V_{£9500}$ = .3134722 + (-.0826214) + (.1254976) + (.2502111) + (-.0000695x9500)

= -0.0536905

$V_{£12500}$ = .3134722 + (-.0826214) + (.1254976) + (.2502111) + (-.0000695x12500)

= -0.0969477

$V_{\text{don't attend university}}$

= 0

Figure 6.2: The indirect utility for four hypothetical degree courses in line with government legislation

The four hypothetical scenarios presented above indicate, that given the quality of rented accommodation, the distance from the respondents' family home, the amount of contact time, the length of the course and the price of fees, the course that costs £3,500 has higher associated utility and is, therefore, preferred. In order to estimate the probability of uptake associated with these four hypothetical courses, respondent predicted probability was computed. This was done by dividing the indirect utility estimates (as presented in Figure 6.2) with the natural logarithm (as defined in the glossary of terms). The results are found in Figure 6.3.

$Pr_{(£3500)} = e^{0.3633095}/e^{0.1548094} + e^{-0.0536905} + e^{-0.0969477} + e^{0.3633095} + e^{0}$

=0.263344012

$Pr_{(£6500)} = e^{0.1548094}/e^{0.3633095} + e^{-0.0536905} + e^{-0.0969477} + e^{0.1548094} + e^{0}$

=0.21378292

$Pr_{(£9500)} = e^{-0.0536905}/e^{0.3633095} + e^{0.1548094} + e^{-0.0969477} + e^{-0.0536905} + e^{0}$

=0.173549213

$Pr_{(£12500)} = e^{-0.0969477}/e^{0.3633095} + e^{0.1548094} + e^{-0.0536905} + e^{-0.0969477} + e^{0}$

=0.166202015

$Pr_{(\text{don't attend university})} = e^{0}/e^{-0.0969477} + e^{-0.0536905} + e^{0.1548094} + e^{0.3633095} + e^{0}$

=0.183121837

Figure 6.3: The probability of uptake from the four hypothetical scenarios[3]

The probability estimates computed in Figure 6.3 show all things being equal, for the average respondent the uptake for a degree course charging £3,500 is predicted higher than those courses charging more than the current rate. This illustrates that respondents are reactive to price and prefer a course that charges less. Nevertheless, it is interesting to see that respondents are willing to pay up to £6,500 per year before seeking alternative employment. This suggests that despite preferring to pay less, respondents would still attend university up to £6,500 per year before considering not attending.

[3] (0.263344012 + 0.21378292 + 0.173549213 + 0.166202015 + 0.183121837 ≅ 1)

Building on these results, the predicted probability was estimated to discover how respondents' preference changed if an English university decided not to charge undergraduate students for tuition: in essence, offering free university education. First, the indirect utility for this course (as discussed earlier in relation to Figure 6.2) was estimated with the results shown in Figure 6.4.

$$V_{£0} = {}^{.3134722} + {}^{(-.0826214)} + {}^{(.1254976)} + {}^{(.2502111)} + {}^{(-.0000695x0)}$$

= 0.6065595

Figure 6.4: Respondents' indirect utility for a university that doesn't charge for tuition

As expected and in line with discrete choice theory (as discussed in Section 2.3) the results show that for the average respondent free tuition has greater utility over fee paying courses and is, therefore, preferred. After this, the probability of uptake was estimated (as discussed earlier in relation to Figure 6.3) to discover the associated probability of choosing a free degree course. The results are presented in Figure 6.5.

$Pr_{(£3500)} = e^{0.3633095}/e^{0.1548094} + e^{-0.0536905} + e^{-0.0969477} + e^{0.3633095} + e^{0.6065595} + e^{0}$

=0.197133606

$Pr_{(£6500)} = e^{0.1548094}/e^{0.3633095} + e^{-0.0536905} + e^{-0.0969477} + e^{0.1548094} + e^{0.6065595} + e^{0}$

=0.16003325

$Pr_{(£9500)} = e^{-0.0536905}/e^{0.3633095} + e^{0.1548094} + e^{-0.0969477} + e^{-0.0536905} + e^{0.6065595} + e^{0}$

=0.12991517

$Pr_{(£12500)} = e^{-0.0969477}/e^{0.3633095} + e^{0.1548094} + e^{-0.0536905} + e^{-0.0969477} + e^{0.6065595} + e^{0}$

=0.124415218

$Pr_{(£0)} = e^{0.6065595}/e^{0.3633095} + e^{0.1548094} + e^{-0.0969477} + e^{-0.0536905} + e^{0.6065595} + e^{0}$

=0.251421724

$Pr_{(\text{don't attend university})} = e^{0}/e^{-0.0969477} + e^{-0.0536905} + e^{0.1548094} + e^{0.3633095} + e^{0.6065595} + e^{0}$

=0.137081029

Figure 6.5: Respondents' predicted probability for a university that doesn't charge for tuition[4]

Closer inspection of the probability estimates suggests that the introduction of a course that offers free tuition has had an impact on the original estimates. In fact, the probability of respondents choosing a degree course that charges between £3,500 and £12,500 have all fallen. Indeed, the course which the respondents preferred was the course with free tuition. These results further demonstrate that there is clear evidence that respondents are reactive to changes in the price charged by English universities and that free tuition is not seen as a sign of poor quality.

[4] (0.197133606 + 0.16003325 + 0.12991517 + 0.124415218 + 0.251421724 + 0.137081029 ≅1)

6.3.5 <u>Section One:</u> Step 5 ~ Respondent reservation price

Stage 5 - **Statistical analysis**

(Section **One)**

Based on a **conditional logit model** using regression analysis

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Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

Once the probability of take up had been discovered, the next task was to estimate respondents' reservation price. Section 3.2 recalls respondents' reservation price to be defined as a monetary figure for the utility associated with the attributes that make up an undergraduate degree course. Based on the technique described in Section 4.2.5.6 respondents' reservation price was then calculated. These calculations are shown in column 3 for the attributes found to be statistically significant with their associated monetary values shown in column 4. It should be clear from the discussion in Section 4.2.5.4 that where effects codes have been used, the constant term represents the mean value for the negative sum of the estimated coefficients. In other words, when estimating respondents' reservation price the constant provides a basis for which a general level of preference for all attributes included in the DCE can be obtained with all values of attributes being added. From this definition, it is possible to see that it would appear that respondents' general preference when transferred into a monetary figure to attend a degree course is exceedingly high. It is important to note that this calculation reflects respondent choice; it is not a figure that the respondents ascribed to. One explanation for this unusually high constant (£30195) could be attributed to the exceedingly high desire to attend an English

university from an early age. As highlighted in graphs O and P in Table 6.2 it is possible to see that over half the respondents reported they wanted to attend university before reaching High School, in turn possibly directly contributing to the exceedingly high constant value (as detailed in Section 6.1.3).

Column 1	Column 2	Column 3	Column 4
Variable	**Level**	**Reservation price calculation ($\beta/-\beta_{priceproxy}$)**	**Consumer reservation price (£)**
CONSTANT	2.0985223	2.0985223 -.0000695	**£30195**
NO OF POINTS *(β_4)*	240 points		β_i=0
	300 points		β_i=0
	360 points		β_i=0
QUALITY OF ACCOMMODATION *(β6)*	Moderate	0.0341768 -.0000695	**£2011**
	Good	.3134722 -.0000695	**£4510**
	Very Good	.5761973 -.0000695	**£8291**
DISTANCE FROM HOME *(β8)*	90 minutes		β_i=0
	135 minutes		β_i=0
	180 minutes	-0.826214 -.0000695	**£1189**
CONTACT TIME *(β_{10})*	18 hours		β_i=0
	27 hours	.1254976 -.0000695	**£1806**
	36 hours		β_i=0
COURSE STRUCTURE COST*(β_{12})*	4 years including one year on placement		β_i=0
	4 year theory based	.2502111 -.0000695	**£3600**
	5 year theory based	-.2434121 -.0000695	**£3502**
COST ($\beta_£$)	£0 to 12,500 (continuous variable)	-.0000695	

β_i=0 = attributes found not to have a statistically significant influence on respondent choice and therefore are valued a zero.

Table 6.6: Reservation price estimates for the attributes that have a significant influence on respondents' choice of course

Everything else being equal respondents are willing to pay an additional £2,011 per year for 'moderate' quality of accommodation, indicating that they associate much importance with the quality of first year accommodation. Furthermore, respondents reported they would pay an additional £2498 per year to receive 'good' quality accommodation that includes fully functioning facilities, access to en suite, a good level of cleanliness, good level of security, closeness to the university and unlimited internet access. However, the introduction of 'very good'

quality accommodation was ranked as having the highest monetary value. On average, respondents are willing to pay as much as £8290 per year or £188.41 per week for a 44 week contract. From this estimate it can be seen that respondents from this study are willing to pay on average £32 more than the current market price per week for very good quality accommodation in Newcastle upon-Tyne (UNITE, 2011). In exchange for this money, respondents receive very quiet accommodation with fully functioning facilities, access to en suite facilities, extremely high levels of cleanliness, very good level of security, close proximity to the university campus and unlimited internet access.

Everything else being equal, respondents were willing to pay an additional £1189 per year for a course located '180 minutes' from their family home. Although these results show respondents are more willing to move away from their family home, these estimates cannot be generalised with students in other parts of England who may be willing to travel further. It is also interesting to note that everything else being equal, respondents are willing to pay an additional £1806 per year to receive '27 hours' of contact time per week. Therefore, showing respondents clearly wanted a course that provides 27 hours contact time per week.

In terms of course structure, the level with the highest monetary value was a 4 year long degree course. Everything else being equal respondents reported they would pay £3600 per year to enrol on a 4 year long course. However, results show respondents were not willing to pay for a standard 3 year degree course or a 4 year course including one year on placement. Nevertheless, respondents did report they would pay as much as £3502 per year to enrol on a 5 year long degree course, suggesting they are only willing to pay for courses that are one to two years longer than the traditional degree course.

It is important to note that reservation price estimates were not calculated for the attribute 'entry requirements'. Hensher *et al.* (2005) reminds us that when calculating consumer reservation price, it is important that the attributes are reported as being statistically significant, otherwise no meaningful estimates can be developed. These results clearly show that respondents involved in this research do not associate any utility with the attribute 'entry requirements'.

6.3.6 Section One: Step 6 ~ Goodness-of-fit

Stage 5 - **Statistical analysis**

(Section **One**)

Based on a **conditional logit model** using regression analysis

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Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

For this step the conditional logit models overall goodness-of-fit was examined. Section 4.2.5.7 details this to involve a number of tests that measure how well the model estimates respondent choices (or observations). Warner (2008) reminds us that the purpose of logistic regression is to locate the best fitting and physically reasonable model to explain the relationship between an outcome (the dependent variable) and the independent variables that make an experiment. Traditionally, this involves measuring the significance of a model using a likelihood ratio test. In this situation, the likelihood ratio test is referred to by Amaya-Amaya *et al.* (2008) as the difference between the estimated (at convergence) model and the base comparison (or intercept) model. However, Long and Freese (2007) warn that when analysing data that is part of a group (or

cluster), observations are no longer independent and developing a conventional likelihood ratio test is no longer considered appropriate.

Therefore, the significance of the conditional logit model was estimated using a Wald Chi-squared test. The importance of this test is highlighted by Korn and Graubard (1990, p. 270) who argue that: *"many surveys collect a large amount of data on each sampled person, which can lead to a multitude of possible independent variables in a regression analysis. Without adjustment for the multiple comparisons, the nominal significance levels of the most significant variables can be highly misleading"*. Indeed, they go on to recognise that when the model is mis-specified in this way, and the estimated data contains less than 32 parameter estimates, the Wald Chi-squared test allows the significance of the model to be interpreted (as discussed in Section 4.2.6.2). Given this, it can be seen the Wald chi-squared statistic of 542.12, distributed with 16 degrees of freedom, demonstrates that the estimated model has illustrative power over the intercept model.

	Coefficient
Log-likelihood (at convergence)	-6857.7158
Log-likelihood (constants only)	-6936.1092
Wald Chi2 test (18-2 df)	542.12
Pseudo R^2	0.1006
No of respondents	218
No of observations	20820

Table 6.7: The Wald chi2 test and McFadden's (1974) pseudo R^2 result for the conditional logit model

In an attempt to further examine the data for the conditional logit model, the overall goodness-of-fit was examined. Following the discussion in Section 4.2.5 McFadden's (1974) Pseudo R^2 statistic was used to measure the model's overall goodness-of-fit. The result from this test is 0.1006 that acknowledges that the model fits the data well.

It is important to note that a review of the DCE and logistic regression literature identifies a number of additional tests for measuring a model's goodness-of-fit. However, many of these tests cannot be conducted using conditional logit models for multinomial designs because probabilities are estimated within groups (Long and Freese, 2007). A detailed account of how to conduct a range of alternative goodness-of-fit tests using logit models is discussed in Section 6.6.5.

6.3.7 Section One: Step 7 ~ Odds ratio

Stage 5 - **Statistical analysis**

(Section **One)**

Based on a **conditional logit model** using regression analysis

Step 1. Demographic data
Step 2. The significance (& joint significance) of the attributes
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Step 5. Respondents' reservation price
Step 6. Goodness of fit
Step 7. Odds ratio

Validity: internal and face

In an attempt to further examine the data, the odds ratio was calculated. This was the final step in the statistical analysis process. Nevertheless, Long and Freese (2007) believe closer examination of the odds associated with the alternative specific variable (ASV) allows for more specific interpretation of the data. Section 4.2.5.6 described the alternative specific variable to be defined as an attribute included in a DCE that is identical for all respondents (Ronning, 2002). In this case, the alternative specific variable was cost, as the price of tuition remains the same for all respondents. The odds ratio was calculated using Stata and data generated (see example in Appendix X). From Table 6.8 the attributes found to have a significant influence are listed in column 1 and their odds ratio values in column 4.

Column 1	Column 2	Column 3	Column 4
Pref	**b**	**P>|Z|**	**e^b**
Moderate	-.139797	0.000**	**0.8695**
Good	.3134722	0.000**	**1.3682**
Very good	.5761973	0.000**	**1.7793**
180 minutes	-.0826214	0.005**	**0.9207**
27 hours	.1254976	0.000**	**1.1337**
4 year theory based	.2502111	0.000**	**1.2843**
5 year theory based	-.2434121	0.000**	**0.7839**
Cost **(ASV)**	-.0000695	0.000**	**0.9999**

b= raw coefficient estimates
z= z-score for test of b=o
P>|Z|= p-value for z-test (≤0.005)
e^b= exp (b) = factor change in odds for unit increase in X

Table 6.8: The odds ratio for the statistically significant attribute levels computed from the conditional logit model

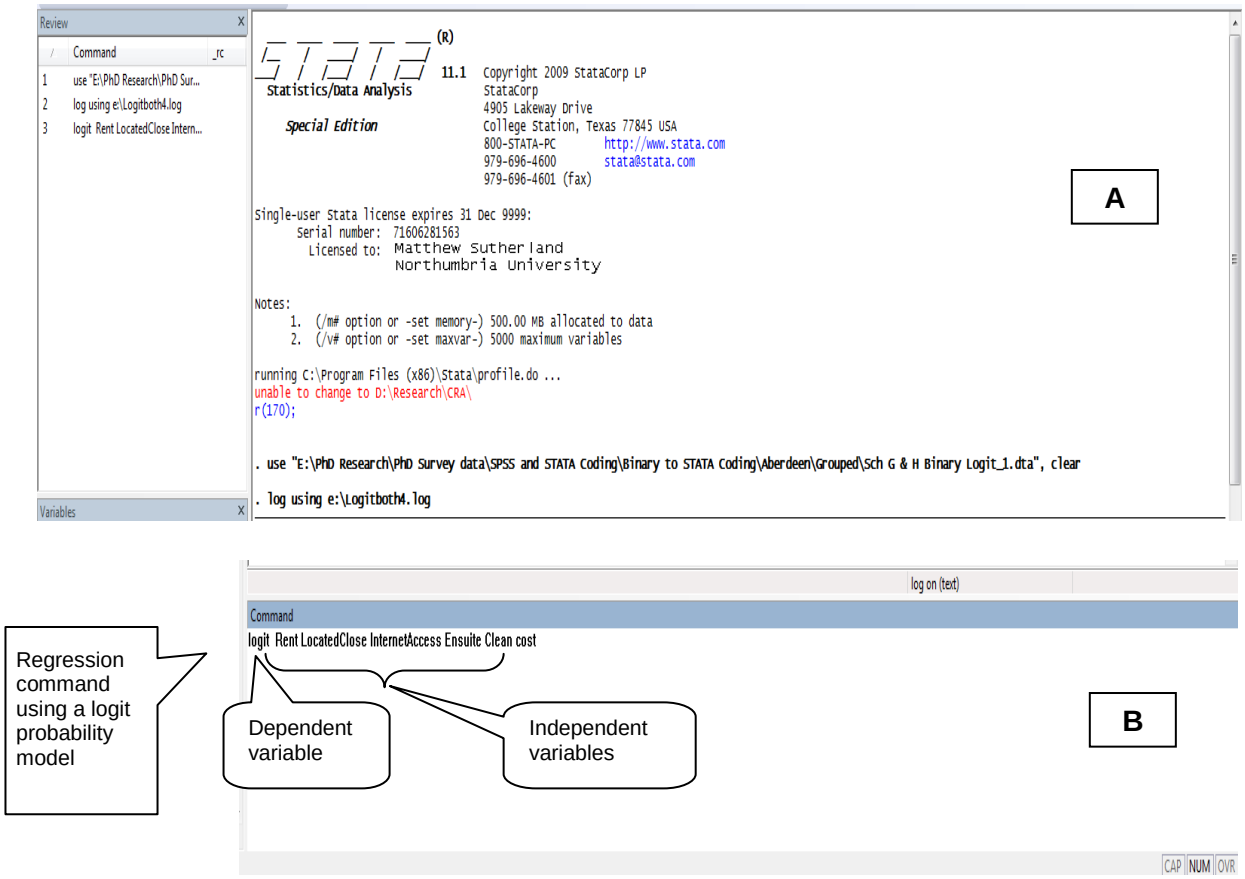
Findings from this test suggest that by increasing the cost of a degree course by £1 decreases the odds (holding the values of the other alternatives constant) of choosing to study an undergraduate degree by a factor of .99 (0.1%). That is, if the price it requires to gain admission onto a degree course increases by £1 while the number of UCAS points required, quality of accommodation, distance from home, amount of contact time and course structure remain constant, the odds of choosing a degree course fall by 0.1%. Similarly, if the cost of tuition was to remain the same, then respondents are 1.37 times more likely to choose good accommodation over poor quality accommodation and they are a further 1.78 times more likely to choose very good accommodation over poor quality accommodation, indicating that all things being equal, respondents are more likely to select better quality first year accommodation.

Results also shown in Table 6.8, report that respondents are 0.9 times more likely to choose a degree course that is located 180 minutes from their family home than one positioned closer or further away, although it was already acknowledged that this may vary for other respondents located in different parts of the country. All things being equal respondents are 1.13 times more likely to choose an undergraduate degree course that offers on average 27 hours

teaching per week, than one that offers fewer or more. Finally, results from Table 6.8 indicate that respondents are 1.28 more times likely to choose a degree course that offers a 4 year long course than a standard 3 year programme or one that offers a placement year in industry. However, all things being equal they are only 0.78 more times likely to select a 5 year long course, suggesting on average, respondents prefer 4 year to 5 year courses.

6.4 Section Two: binary data using the logit model

Since the attribute 'facilities' was found to influence respondent choice for both price and quality of first year accommodation a smaller DCE was developed. This made up Section **Two** of the survey and was based on a binary design as discussed in 6.1.1. This meant respondents faced a dichotomous choice. Therefore a logit probability model was used to analyse the data (as displayed in Figure 6.6). Screen print (A) shows how the data was calculated using specialist statistical software Stata. The regression command is shown in Screen print (B). Where rent represents the dependent variable (would you rent: yes/no) the remaining attributes represent the independent variables (Chapter 5 dealt with how these were selected). From Screen print (C) it is possible to see how the data was generated. These results are discussed in the remainder of this chapter.



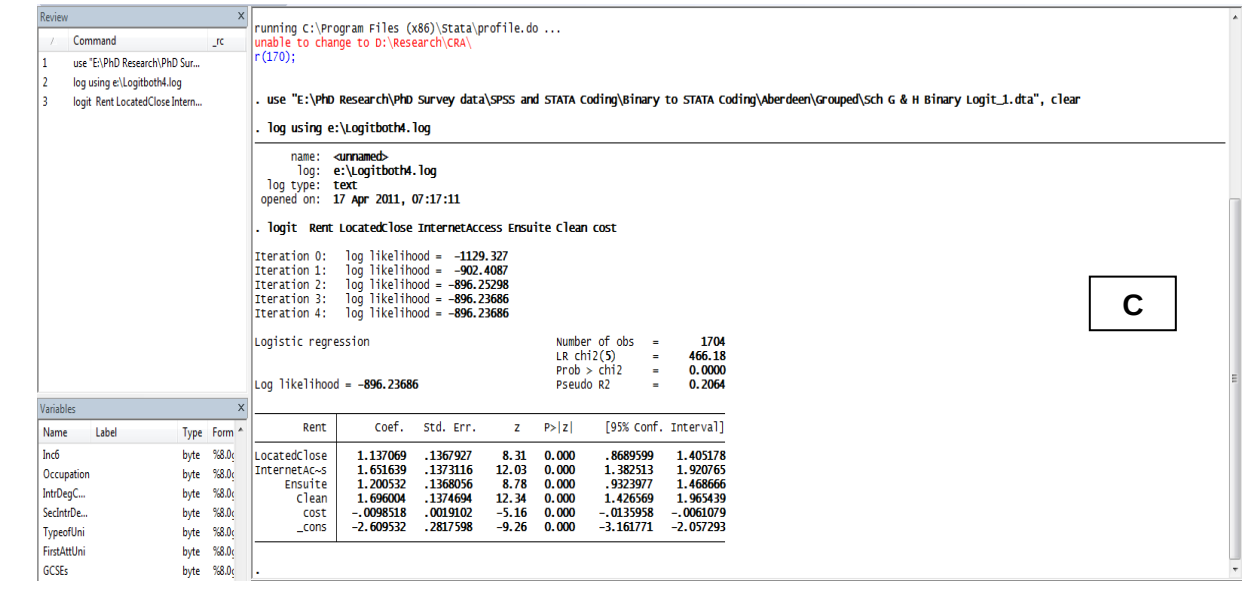


Figure 6.6: A screen print from Stata when running the logit probability model

6.4.1 <u>Section Two:</u> Step 2 ~ The significance of the attributes

In this section, the attributes included in Section **Two** of the survey are examined. The attributes are listed in column 1 and their associated levels are shown in column 2. Again Chapter 5 dealt with how these were developed. Using Stata the logit model was run and the regression results generated. Similar to the conditional logit model, the attributes are considered significant at a 95% confidence level, with the Wald test being used to check the significance of each of the attributes. The results from the Wald test can be seen in column 5 in Table 6.9 labelled P>|Z|. From this it is possible to see that all five attributes are statistically significant (≤.005), acknowledging that location, internet access, access to en suite facilities, clean accommodation and cost all influence respondents choice of accommodation.

Column 1	Column 2	Column3	Column 4
Variable	**Level**	**Coefficient**	**P>|Z| *(outcome from the Wald test)***
LOCATED CLOSE *(β_2)*	No Yes	1.137069	0.000**
INTERNET ACCESS *(β_4)*	No Yes	1.651639	0.000**
EN SUITE *($\beta 6$)*	No Yes	1.200532	0.000**
CLEAN *($\beta 8$)*	No Yes	1.696004	0.000**
COST OF RENTING *($\beta_£$)*	£50 per week £75 per week £100 per week £125 per week	-.0098518	0.000**
CONSTANT		-2.609532	0.000**

**significant at a 95% confidence level/ separate Wald Test for joint significance 0.0000

Table 6.9: The significance of the attributes from the binary design

Similar to the conditional logit model, the joint significance of the attributes was also checked. The results from this separate Wald Test (as shown at the bottom of Table 6.9) show no relationship between the attributes, implying respondents' to be able to view the attributes independently.

6.4.2 <u>Section Two:</u> Step 3 ~ Direction of effect for the significant attributes

Following checks to identify the significance of the attributes, the direction of effects could be calculated. The purpose of the test was to discover respondents' indirect utility for the attributes included in Section **Two** of the survey. This involves looking at the direction of the coefficient estimates in column 3 to see whether they were moving in the expected direction (as examined earlier for the conditional logit model in Section 6.3.3).

Column 1	Column 2	Column 3	Column 4
Variable	**Level**	**Coefficient (Direction of effect)**	**P>|Z| *(outcome from the Wald test)***
LOCATED CLOSE *(β_2)*	No Yes	**1.137069**	0.000**
INTERNET ACCESS *(β_4)*	No Yes	**1.651639**	0.000**
EN SUITE *($\beta 6$)*	No Yes	**1.200532**	0.000**
CLEAN *($\beta 8$)*	No Yes	**1.696004**	0.000**
COST OF RENTING *($\beta_£$)*	£50 per week £75 per week £100 per week £125 per week	**-.0098518**	0.000**
CONSTANT		**-2.609532**	0.000**

**significant at a 95% confidence level

Table 6.10: The size of the coefficients for the attributes found to be statistically significant for Section Two of the DCE

From the results displayed in Table 6.10 it is possible to see that four of the five attributes have a positive influence on respondents' choice of first year accommodation. Having university accommodation that is 'located close' to the university campus has a positive influence on the respondents' choice of accommodation. Similarly, respondents reported that 'internet access' had a positive influence on their choice of first year accommodation. Therefore, suggesting that if internet access were to be removed from the property, then respondents would look for a different place to live. There is also evidence that if the attributes 'en suite' and 'cleanliness' were also not provided by the

accommodation provider then respondents would seek to choose different accommodation, thus demonstrating that having access to their own clean toilet facilities has a positive influence on the respondents' choice of accommodation.

The only attribute found to have a negative influence on respondents' choice of accommodation was 'cost of renting'. The negative coefficient estimate suggests that although the cost of renting (as shown in column 5) is considered significant when choosing a place to live, when the cost of renting rises above £125 per week respondents begin to associate a negative influence with the attribute. In other words, respondents would look to stay at home or search for other alternative accommodation rather than pay more than £125 per week for first year accommodation.

It is worth noting that for the conditional logit model the probability of take up was now examined. Since analysing binary data with a logit model the probability of take-up is unable to be estimated. This is because probability estimates can only be computed when analysing multimodal data (Ryan *et al.* 2008a). Nevertheless, it is possible to calculate respondents' reservation price.

6.4.3 Section Two: Step 5 ~ Respondent reservation price

For this step respondents' reservation price was calculated. Similar to Section 6.5.3 respondent reservation price was defined as a monetary figure for the utility associated with the attributes that make up an alternative. In this case the alternative was defined as first year accommodation. Estimates were calculated based on the same technique as described in Section 4.2.5.6. This calculation is shown in Table 6.11 in column 3 with the attributes associated monetary values shown in column 4. The role of the constant (as discussed in Section 4.2.5.4) is to represent respondents' underlying preference for a product or service and reflects the base of the dummy variables; in this case, the underlying preference towards choosing first year rented accommodation. That is, the constant is

indicative of the real price that respondents would be willing to pay and is simply a measure of demand for securing good quality first year accommodation.

Column 1	Column 2	Column 3	Column 4
Variable	**Coefficient**	**Reservation price calculation (β/-$\beta_{priceproxy}$)**	**Consumer reservation price (β_i/-$\beta_{priceproxy}$)**
Constant	-2.609532	-2.609532 -.0098518	**£265**
Located close (β_1)	1.137069	1.137069 -.0098518	**£115**
Internet access (β_2)	1.651639	1.651639 -.0098518	**£168**
En suite (β_3)	1.200532	1.200532 -.0098518	**£122**
Clean (β_4)	1.696004	1.696004 -.0098518	**£172**
Cost of renting ($\beta_£$) £0 to£125 (continuous variable)	-.0098518	-.0098518	**-**

Table 6.11: Respondent reservation price estimates for the attributes contained within the binary design

Respondents are prepared to pay £265 per week for first year rented accommodation. It is worth noting that respondents were not restricted to North-East universities and their willingness to pay may have been inflated by a large number wanting to study in south east based universities. In fact student accommodation providers UNITE (2011) find students on average are willing to pay between £250 and £300 for first year accommodation in London. Accommodation that is located close to the university campus increases respondents' reservation price by £115 per week. Internet access increases respondents' reservation price by £168 per week with access to en suite facilities increasing respondents' reservation price by a further £122 per week. Finally, having accommodation that is clean increases respondents' reservation price by £172 per week.

6.4.4 <u>Section Two:</u> Step 6 ~ Goodness-of-fit

As discussed in Section 4.2.5.2 there are two types of inferential tests that are used in logistic regression to access goodness-of-fit. They are testing the model and testing the individual variables (Tabachnick and Fidell, 2007).

The logit model's overall significance is accessed using the likelihood ratio test. The importance of this score is reported by Sharma (1996, p. 323) who indicated that the test provides an opportunity for the hypotheses of the model to be tested, claiming: *"nonrejection of the null is desired, as it leads to the conclusion that the model fits the data"*. From this, it can be seen the chi-squared statistic of 466.18, distributed with 3 degrees of freedom, demonstrates that the estimated model has illustrative power over the intercept model.

In addition to accessing the overall significance of the model, the goodness-of-fit was also calculated to discover the properties of the logit model. This involved using a McFadden's (1974) pseudo R^2. However, Hensher *et al.* (2005) warn that the values taken from R^2 are different from those in ordinary linear regression. In fact, the writers go on to explain that: *"pseudo R^2 values between the range of 0.3 and 0.4 can be translated as an R^2 of between 0.6 and 0.8 for the linear equivalent"* (Hensher *et al.* 2005, p. 339), implying a pseudo R^2 estimate taken from a DCE and analysed using logistic regression should be lower than those using ordinary linear regression. Given this, the results from the logit model are illustrated in Table 6.12, acknowledging the binary logit model (pseudo R^2) fits the data very well.

	Coefficient
Log-likelihood (at convergence)	-896.23686
Log-likelihood (constants only)	-1129.327
Likelihood ratio Chi2 (5-2df)	**466.18**
Pseudo R^2	**0.2064**
No of respondents	213
No of observations	1704

Table 6.12: The likelihood ratio test and McFadden's (1974) pseudo R^2 result for the logit model

After careful inspection of the likelihood ratio and pseudo R^2 results, preliminary analysis of the variables using the decline-of-risk statistic was calculated. Traditionally, this involves using the Hosmer and Lemeshow (HL) statistic (Hosmer and Lemeshow, 2000). Findings from this test suggest the logit model to fit the data very well. The significance of this fit is shown below in Figure 6.7. Long and Freese (2007, p. 157) explain: *"the closer the solid line to the diagonal...the better the fit of the model"*. The graph acknowledges that the model fits the lower and upper probabilities of renting first year accommodation, showing that the model fits the data well.

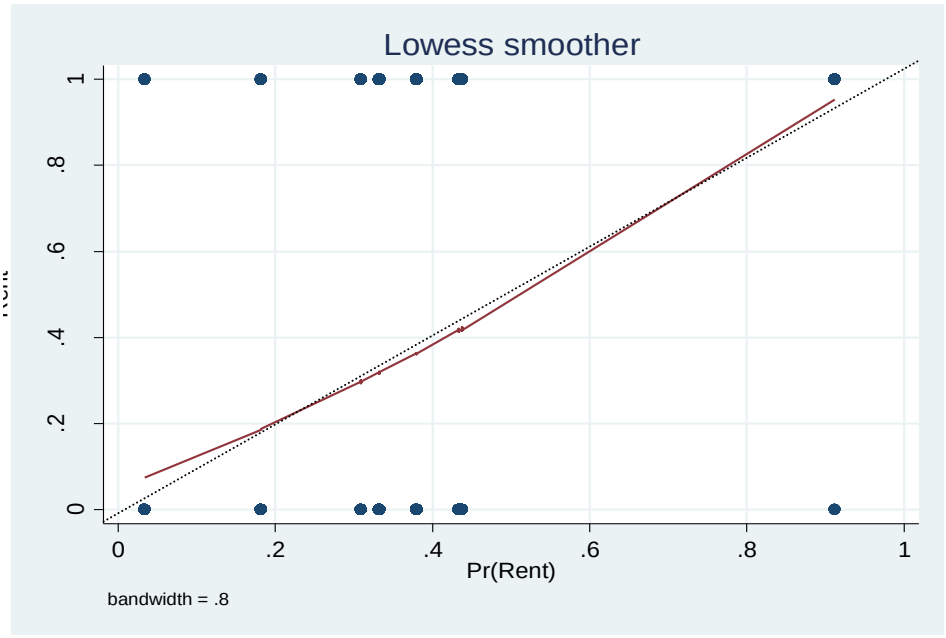


Figure 6.7: A graph to show the logit models goodness-of-fit using the HL statistic

However Hosmer and Lemeshow (2000, p. 151) argue that: *"the advantage of a summary goodness-of-fit statistic like (HL) is that it provides a single easily interpretable value that can be used to access fit. The great disadvantage is that in the process of grouping we may miss an important deviation from fit due to the small number of individual data points. Hence we advocate that, before finally accepting that a model fits, an analysis of the individual residuals and relevant diagnostic statistics be performed"*, suggesting further investigation into the individual variables goodness-of-fit is required.

In an attempt to further examine the data, the residuals from the logit model were investigated. As mentioned in Section 4.5.2, Tabachnick and Fidell, (2007) define residuals to be the difference between a model's predicted and observed outcome for every observation within a given sample. Furthermore, they go on to describe any residuals that do not follow the prediction of the model to be considered outliers, indicating fewer outliers contained within a model would improve the model's overall goodness-of-fit. Although Long and Freese (2007, p.

148) argue that: *"there can be no hard-and-fast rule for what counts as a "large" residual"*, the residual values for all 5 independent variables were calculated to identify any unusually large results. However, as expected, Figure 6.8 shows that none of the independent variables included in the logit model report having any potentially problematic values, implying the data fits the model well.

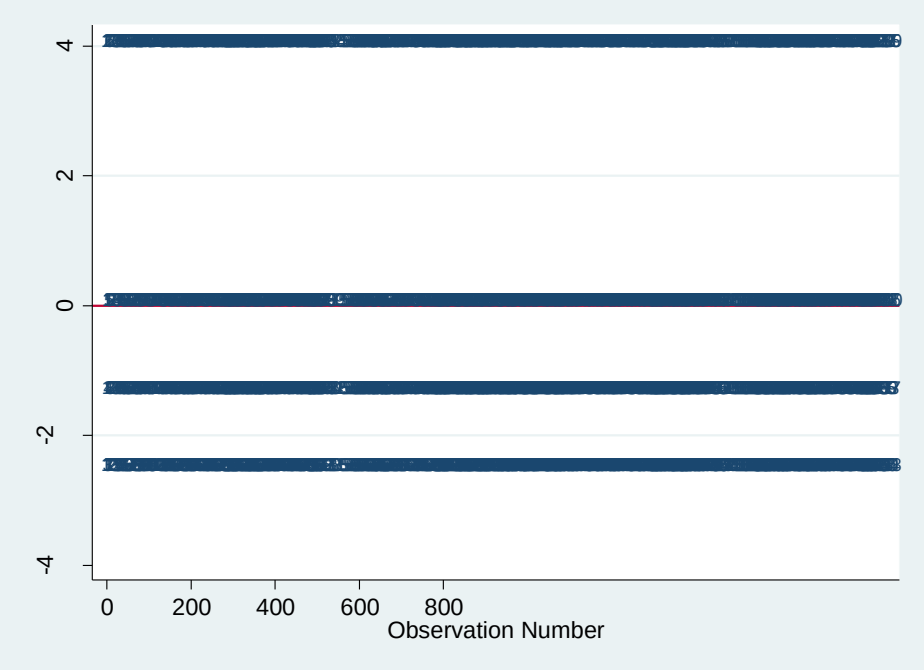


Figure 6.8: The graphs showing the residual values for the logit model

Figure 6.8 shows none of the residuals to have an extraordinary high values. Therefore suggesting that, there is no need to examine residuals further. If the data did not fit the model well then the residual values would be spread unexpectedly across the graph. An example of this is not presented here, but can be found in Long and Freese (2007, p. 148-149).

The goodness-of-fit tests for the logit model concluded by estimating Count R^2. Count R^2 can be described as estimating the ratio between the observed and predicted values in a model. According to Long and Freese (2007) the main advantage of estimating Count R^2 is that it measures the percentage of correct guesses beyond the number that would be correctly observed by simply choosing

the largest marginal. From Table 6.13 it can be seen that positive responses were predicted for 213 observations of which 203 were correctly classified due to the observed responses being positive. However, 10 observations were incorrectly classified due to the observed responses being negative. In addition to this, out of 1491 observations for which a negative response was predicted, 1051 were correctly classified and 440 were incorrectly classified, indicating that overall 73.59% of observations to be correctly classified.

Classified	True		Total
	D	~D	
+	203	10	213
-	440	1051	1491
Total	**643**	**1061**	**1704**

Table 6.13: Count R^2 representing the ration between the number of observed and predict values

6.4.5 Section Two: Step 7 ~ Odds ratio

The final step in analysing the logit model was to estimate the odds ratio. The logit model was run using commands from Stata. Section 4.2.2.6 discussed how this was developed along with the need to identify the alternative specific variable (ASV). For the purpose of Section **Two** the ASV was cost. This is labelled in column 1 along with the other attributes shown in Table 6.14. Column 4 represents their values and how these are influenced by the ASV.

Column 1	Column 2	Column 3	Column 4
Pref	**b**	**P>|Z|**	**e^b**
Located Close	1.13707	0.000**	**3.1176**
Internet Access	1.65164	0.000**	**5.2155**
En suite	1.20053	0.000**	**3.3219**
Clean	1.69600	0.000**	**5.4521**
Cost **(ASV)**	-0.00985	0.000**	**0.9902**

b= raw coefficient estimates
z= z-score for test of b=o
P>|Z|= p-value for z-test (≤0.005)
e^b= exp (b) = factor change in odds for unit increase in X

Table 6.14: The odds ratio for the logit model

Findings from this test suggest that increasing the cost of accommodation by £1 decreases the odds *(holding the values of other alternatives constant)* of choosing to rent first year accommodation by a factor of .99 (0.1%). That is, if the price it cost per week to rent first year accommodation increased by £1 while the location, access to internet, en suite and cleanliness remain constant, the odds of choosing to rent accommodation fall by 0.1%. From the Table 6.14 it is also possible to see that if the price of rent of first year living accommodation remains constant, respondents are 5.45 more times more likely to choose accommodation that is clean, indicating that all things being equal, respondents are more likely to select clean accommodation when seeking to attend an English university.

The odds listed in column 4 also show that respondents are 5.21 times more likely to choose to rent first year accommodation that offers internet access. One explanation for this high demand was first highlighted in Chapter 5. As part of validating the attributes, respondents were asked their opinion on how important access to I.T facilities was when choosing a degree course. Findings from these interviews revealed that this was not a major factor as most students already have access to their own computer; thus, assuming students bring their computers to use at university. Nevertheless, this may explain why there is so much demand for internet access as the respondents will want to use their computers to access the internet.

Estimates in column 4 also report that respondents are 3.32 times more likely to choose rented accommodation that offers en suite facilities than choose accommodation that requires the respondents to share wash and toilet facilities. Finally, respondents are 3.11 times more likely to rent accommodation that is located close to the university campus. This may be due to the majority of respondents being female and feeling safer located close to the campus (see graphs A and B).

6.5 Assessing validity

As previously discussed in Chapter 4 internal validity is more commonly tested when conducting DCE research, which involves checking whether the coefficient estimates are moving with a priori expectations. Indeed, Lancsar and Louviere (2008) describe how this can be tested by examining whether the results from a study conform to the axioms of discrete choice theory. As discussed in Chapter 3, the axioms of discrete choice theory provide a set of principles that school leaver undergraduate students follow when undertaking course level decision making (Peter and Olsen, 2001). This assumes students will construct decisions in order to maximise their chances of receiving the highest level of utility. Closer inspection of the results, taken from Section **One** of the study, show only one attribute to be statistically significant on respondent choice of course at every level. In other words for the attribute 'quality of accommodation', there is a linear relationship between utility and quality. In fact as the quality of accommodation increases so do respondents' associated level of utility, implying the estimates for this level to be consistent with *a priori* expectations. This relationship was also apparent for the attribute 'cost of fees' despite the attribute being left continuous. The parameter estimate for this attribute show a rise in the price of tuition to have negative influence on respondents' utility when choosing a degree course (-.000695). In other words as the price of a course increased, the less likely they were to choose a degree course, again implying that the estimates for this attribute are consistent with a priori expectations.

Similarly, from looking at the results generated from Section **Two** (the logit model) the signs on coefficients were as expected with respondents reporting they would prefer to be located close to the university campus, have internet access, en suite facilities, clean accommodation and for it to be cheap, rather than be located away from the university campus with no internet access, no en suite facilities, unclean accommodation and for it to be expensive. This indicates

that the model is consistent with *a priori* expectations and supports the theoretical validity of this model.

The other assumption is that respondents have clearly defined preferences and can ascribe preference for one alternative over another. Furthermore, it can be seen that respondents associate preference for different levels for the attributes 'distance from home', 'contact time' and 'course structure', showing respondents to be able to ascribe preference for one attribute over another. Finally, Ryan and Gerard (2003) describe the importance of examining face validity when conducting DCE research. Face validity concerns efforts to remove ambiguities found with the layout or working of the survey (De Bekker-Grob *et al.* 2010). For this study, a rigours pilot process was undertaken to access the layout and working of the questionnaire. Closer inspection of the number of respondents who completed the Sections **One** and **Two** of the survey show overall 97% of respondents to have successfully complete all 32 choice sets, with only 1% completing fewer than 29 choice sets. Similarly, for Section **Two** 93% of respondents successfully managed to complete all 8 choices sets with as few as 7% not managing to complete all 8 choice sets. These figures suggest the revisions to the layout and wording of the questionnaire have had a positive influence in securing such a high number of respondents.

It is important to note that reliability (as discussed in Section 4.2.6.9) was not tested. Chapter 4 detailed how reliability tests cannot be conducted on experimental research.

6.6 Chapter summary

This chapter has reported the findings from a DCE that was developed to investigate respondent preference and reservation price for the attributes and levels identified from the literature and validated within Stage 1 of this project. Following a brief review of the respondent characteristics, focus turned towards

Section **One** of the survey. A Wald test was conducted to illustrate the significance of the attributes. Findings from the conditional logit model revealed most attributes to be statistically significant predictors of respondent choice. For these attributes, a discussion on the direction of effect was then presented. Following this a summary of the predicted probability for these attributes was provided before estimating respondent reservation price. In line with previous DCE research the overwhelming demand in this case for university education inflated the underlying constant. This resulted in unusually high reservation price estimates for the conditional logit model. However, on average, respondents were willing to pay more for a longer degree course that offers more contact time. Following this the model's goodness-of-fit was tested. Findings from these tests reported that the conditional logit model has significant benefits over the intercept model. Section **One** concluded with a look at the odds ratio for the attribute levels found to have significant influence of respondents' choice of course. Results from this test showed respondents to have greater odds of choosing a degree course that is 4 years long and has access to very good quality accommodation.

For the remainder of the chapter, attention turned towards Section **Two** of the survey, which investigated respondents' preference towards renting first year accommodation. As with the conditional logit model a Wald test was conducted to test the significance of the attributes. This showed all five attributes to be positive predictors of respondents' choice of accommodation. The direction of effect was then examined showing respondents to associate negative preference when the cost of accommodation began to rise. Due to the fact the probability of estimates was unable to be calculated, reservation price estimates were calculated, showing respondents are preferred to pay £256 for first year accommodation, which was found to the average students are willing to pay in some cities such as London. Goodness-of-fit was then examined acknowledging the logit model to have fitted the data well and for the study to have developed suitable quantitative

methods for measuring respondent choice of accommodation. The chapter concluded with a look at the odds ratio revealing ‘cleanliness’ to have the greatest chance of selecting first year accommodation. These findings along with those reported from the conditional logit model will now be discussed alongside the existing literature in order to provide a synthesis for the two models.

Chapter Seven

Discussion

7.0 Introduction

The objective of this chapter is to critically evaluate the findings taken from the discrete choice experiment (DCE) together with the existing marketing literature in order to develop an insight into the contribution of this research. The motivation for this empirical research stemmed from theoretical literature in Chapters 2 and 3 where it emerged that little is known about the attributes which influence student choice of course and the monetary values attached to them. The following discussion will relate the findings presented in Chapters 5 and 6 to the research objectives outlined in Chapter 1 in order to establish how the work carried out within this thesis relates to the extant published research. This chapter begins with the contributions made by this study and then the development of market research in the HE context is discussed. From here, the attributes that influence student choice are considered and the rationale for the inclusion of behavioural theory is explored. The focus then turns towards the results taken from the DCE, synthesising the findings from the reservation price study along with the findings from a similar study published by OpinionPanel (2010). The chapter concludes with closer examination of the decision taken to develop a DCE.

7.1 Contribution to knowledge

Given the nature of the research carried out, the author contends that this study directly adds to the existing body of literature in the discipline of marketing. In order to highlight clearly these contributions, it is important to present briefly the areas to which this study adds to the existing knowledge base as a way of introducing the reader to the chapter. It is important to note that in order to draw

attention to the reader the contributions are highlighted in bold and positioned within a box as the subset in each section.

1. ***This study has contributed to the existing body of knowledge through examining the attributes that influence course level decision making behaviour. Despite extant research focusing on access and means of stimulating private investment, this research has reacted to calls from Brown (2010) to identify the attributes that prospective students consider important when choosing a full-time undergraduate degree programme in England.***

2. ***The qualitative element of this research has furthered knowledge into the meaning of the attributes and their levels, which can be used in future choice research. This study acknowledges six of the nine attributes to be considered important when choosing a degree course, finding similarities with the existing published research. Nevertheless, this study adds to the knowledge base by revealing the values attached to these attributes (as discussed in Section 7.3)***

3. ***The construction of a theoretical model that presents the attributes and levels that influence prospective students' choice of degree course provides a new insight into the factors that are most important when applying to university (Section 7.3.2).***

4. ***Whilst the attributes that influence choice of accommodation are not the main focus of this research, by developing a smaller DCE to estimate the attributes considered to influence student choice, this has added to the existing knowledge on how to estimate accommodation based decision making (Section 7.3.2).***

5. ***It would appear that the DCE developed for this study has demonstrated how it is possible to satisfy the behavioural axioms of consumer choice when measuring course level decision making behaviour (Section 7.4)***

6. ***By developing a DCE, as opposed to a rating scale approach that has dominated previous course level decision making, this has enabled the attributes and monetary values to be estimated. Whilst care must be taken when interpreting the reservation price results (as detailed in Section 3.5) due to the size of the underlying constant (as detailed in Section 6.3.5), this research has provided a new insight into the monetary values prospective students attach to the attributes that make up an undergraduate degree course (Section 7.5).***

7. ***The decision to investigate student choice using a DCE generates awareness for the benefits associated with DCE research. Whilst most DCE research has been developed outside the marketing field, this study provides a new insight into conducting*** **DCE research from a marketing perspective (Section 7.6).**

7.2 The Higher Education (HE) sector – the current approach

Chapter 1 provides an introduction to the research, positioning the study within the English HE sector. This section revisits the existing published research that has been conducted in the English HE sector to provide new information based on the recommendations published in the Brown (2010) review. Therefore, this section attempts to build upon the existing research and to expand the area of course level student choice with emphasis on explaining how students will react when the price of tuition fees increases.

Much of the previous research in the education literature has explored access and financing of English universities. The Barlow report published in 1946 argued more has to be done to improve access into English universities, and allow people from a broad range of social class to have the chance to enrol onto an undergraduate degree (Great Britain. Ministry of Education, 1946). In fact, recommendations published in 1985 in the Jarratt report noted more transparency was needed into the funding of English universities in order to meet the rising demand for places on undergraduate degrees (Great Britain. Committee of Vice-Chancellors and Principles, 1985). In this case, the Dearing report was commissioned to make recommendations about the long-term financing of English universities with an emphasis on increasing levels of private investment (Great Britain. Committee for Education, 1997). This led to the introduction of the tuition fees, allowing English universities for the first time to charge students (£1,000 per year) for places on their undergraduate courses. However, in 2003, a report published by the Department for Education and Skills recommend the price of tuition fees should be increased to £3,000 per year (Great Britain. Department for Education and Skills, 2003). Palfreyman (2004) supported this argument, believing more investment was needed for English universities. Therefore, the above research emphasised the need for greater inward investment. However, Browne (2010) noted funding could be improved through the removal of the fee cap. However, in order to attract and retain prospective undergraduate students, more research was needed into the attributes that influence course level decision making behaviour.

Through developing a DCE and examining the attributes that influence student choice of course, this research has directly responded to calls from Browne (2010) that future research into English universities should focus on the attributes that influence student choice rather than on access. Indeed, choosing to develop a DCE also allows a new insight into the monetary values attached to the

attributes found to have a significant influence on student choice of course. Thus, meaning this research has had a binary effect, by extending attribute and funding research to the existing education literature.

Through reading the education literature this study responded to the need to examine the attributes that influence student choice of course.

7.3 Revisiting the existing published research into student choice

The specific aims of Chapter 3 could be split into two objectives: First, to explore the attributes that are considered important when choosing an undergraduate degree course and examine whether the development of discrete choice modelling would provide a theoretical alternative approach to using rating scales when estimating course level decision making. The second aim of this chapter is to critically review the literature on estimating consumer reservation price and from that review puts forward an alternative approach to estimating student reservation price for the attributes that comprise a degree course.

7.3.1 Objective 1~ Exploring the attributes that influence student choice

As noted in Chapter 2, research in marketing has traditionally focused on how information can be used to ensure a business's alternative remains in a consumer consideration set. However, universities' understanding of the reasons why students choose a particular university is central when trying to attract and retain prospective students (Maringe, 2006). Consequently, demand for understanding the individual attributes that influence student choice rather than the way information is processed has increased. Nevertheless, previous published research in the field of course level student choice (as discussed in Sections 2.3 and 2.3.1) has focused on ranking the attributes, meaning very little is known about how the attributes are defined and what value is attached to them. This section attempts to synthesise the attributes from the extant literature with the findings taken from the qualitative research (as detailed in Chapter 5) in

order to develop a greater understanding into the attributes and levels that influence course level decision making behaviour.

Entry requirements: In Section 3.1 it was indicated that entry requirements influence university level decision making. In fact, Brown *et al.* (2009) noted that entry requirements can have a direct effect on a university reputation. The above point seems to suggest that the higher the entry requirements, the better the university is considered amongst prospective students. In terms of choosing an undergraduate degree course, this would imply that students who are looking for a good degree course should only select a course with high entry requirements. In fact, regardless of background or type of school, student respondents considered entry requirements to be a major factor when choosing an undergraduate degree course, with high entry requirements being seen as an indicator of higher academic standard. In the case where students are receiving monetary support to attend university, respondents from School **B** described how higher entry requirements are considered more attractive by prospective employers, suggesting higher entry requirements are seen more favourably when searching for a well paid job.

Perhaps the most interesting point was that this view was entirely rejected by the stakeholders (as defined in Section 2.2.1) who described high entry requirements to be strictly governed by demand, implying that undergraduate courses that benefit from strong interest can introduce higher entry requirements as a means of filtering applications. The above emphasises a clear difference of view between student and stakeholder respondents with stakeholders firmly dismissing the earlier contributions of Brown *et al.* (2009) and the notion that students only consider entry requirements to be an indicator of quality when choosing a degree course. However, the findings from this research are only based on a small number of interviews compared to quantitative research.

An equally large challenge was to quantify entry requirements. Contributions outlined in Section 3.1 acknowledge that no previous study has attempted to quantify entry requirements, despite student and stakeholder respondents both agreeing that the number of points is the major factor when choosing a full-time undergraduate degree course; a logical finding, given that entry requirements have always been numerically presented. Throughout the interviews, respondents were asked to report the number of points needed to secure admission onto their prospective degree course. The findings from this research acknowledge clear similarities between all respondents, with on average, respondents applying for a course requiring between 180 and 360 UCAS points. Therefore, this suggests in the context of this study that, on average, courses that are requiring less than 180 UCAS points might attract less demand.

Facilities: Much of the previous literature on student choice suggests student demand for university facilities developed in the 1990s. Fleming and Storr (1999) were amongst the first to identify that an institution's facilities have an influence on prospective students' choice of institution. The findings from this research project suggest this to be true, with facilities perceived to stimulate the student learning experience. Throughout the interviews, stakeholder and student respondents agreed that facilities were examined closely when visiting the institution, acknowledging both students and stakeholders consider facilities to influence choice of course. The findings from this research also reported that students expect to be taught how to use facilities (e.g. industry specific computer software) that are transferable once in employment. All of this led to student and stakeholder respondents agreeing that facilities play a significant factor in their choice of undergraduate degree course, confirming Maringe's (2006) argument that the attributes that influence the choice of institution are closely related to that of choice of course.

As studied by Price *et al.* (2003) more recent investigations into university level decision making suggest the availability of computers influence student choice. The above contributions clearly emphasise the importance of computers when studying at university, a logical finding given the continuous development in computer software. However, the findings from this research seem to suggest students consider this to be untrue. In fact, only stakeholder respondents considered access to computers to be important with findings from the interviews suggesting that students place more emphasis on the learning environment (e.g. the lecture theatre and seminar classrooms) rather than the availability of computers. One explanation for this could be that today's students have such good access to ICT that allows them to retrieve information instantly, that the availability of university computers is not considered as important as it was in the past.

Price *et al.* (2003) also highlighted that prospective students consider the library facilities when considering university level decision making. Although the literature on course level choice claims similarities between those factors at a university level, little is known about the role of library facilities. The above argument emphasises that prospective students may attach significant importance to the library, when choosing an undergraduate degree course. Indeed, the findings from this study are in line with Price *et al.* (2003) who identify the size and accessibility of the library as an influence on student choice of course. But in this case, respondents also indicated that the impact of facilities on student choice of course also concerned extra-curricular activities. It was also found that the Students Union and sports facilities have an influence on student choice of course, with students at fee paying schools generally placing more emphasis on sporting facilities than those students in state education.

Although the literature on student choice argued that prospective students are more commonly concerned about the availability of computers and library

facilities, many previous contributions regarded the quality and price of university owned accommodation as more commonly associated with the attribute facilities (Price *et al.* 2003; UNITE, 2007), with Price *et al.* (2003) highlighting how access to ensuite facilities, I.T, internet access, cleanliness and price all influence university level decision making. Throughout the interviews stakeholders reported access to first year living accommodation to be considered very important. Student respondents were also quick to comment on the quality of the first year living accommodation, acknowledging high quality clean accommodation to be very important. Internet access and ensuite facilities were both mentioned as affecting student choice, with the student respondents further claiming the location of first year living accommodation to be very important. Closer examination of the results indicate the distance of first year accommodation from the university campus influences student choice with individuals admitting they wanted to live in a central location. This suggests that students place much emphasis on reducing possible travelling time. This is in line with previous research on first year university accommodation (Greenhalgh, 2009).

Other results from the interviews confirmed the contributions of Price *et al.* (2003) that the price of university rented accommodation did influence student choice. Great emphasis was placed on the price of accommodation with one stakeholder reporting that students would pay up to £125 per week for accommodation that was clean, located close to the university campus, had ensuite facilities and internet access. In contrast, students from School **D** reported they would pay between £50-£90 per week but confirmed they would pay more for better quality accommodation.

In summary, perhaps the most predictable findings from the interviews concerned the quality and price of first year accommodation. In line with previous research access to ensuite facilities, internet access, cleanliness and price were all considered to influence student choice (Price *et al.* 2003). One theme that was

rejected was computers with internet access however access to Wi-Fi was considered important, suggesting that most students own their own computer. Yet, the price was also of clear importance to prospective students, with students willing to pay more for better quality accommodation. It is, therefore, of interest to understand how quality and the price of university accommodation influence prospective students choice of course.

Graduate employment: Of the two studies which have investigated the attributes that influence student choice of course, both James *et al.* (1999) and Maringe (2006) highlight the importance of graduate employment on prospective student choice of undergraduate degree course. Although the study by James *et al.* (1999) took place in Australia, Maringe (2006) acknowledged the influence of graduate employment on prospective students in England. In the case of this study, students revealed thinking about what they expected to do once graduating, although throughout the interviews respondents from School **B** who were receiving monetary assistance to attend sixth form put the most emphasis on employment rates. This, therefore suggests, that in 2009 when the data was collected that the fear of rising unemployment was more of an issue than with other respondents. Despite this initial interest, further examination of the respondents revealed little evidence that graduate employment was overly important. It is possible that the students' failure to acknowledge graduate employment might be because students at this point in their lives are only interested in their student experience (Paton and Prince, 2011) and will only consider graduate employment opportunities once enrolled at university - a view that was suggested by the majority of stakeholder respondents. It was also interesting to note that out of all the student respondents, only one respondent had reported thinking about postgraduate study, further reinforcing students' focus on their immediate university experience. The findings also indicated that students only had a vague indication of graduate starting salaries, suggesting

little time spent on considering postgraduate employment. Indeed, the findings from this study seem to be at odds with James *et al.* (1999) and Maringe's (2006) argument that prospective students place great emphasis on graduate employment when choosing an undergraduate degree course, implying that students focus initially on the immediate student experience.

Location: As stated by James *et al.* (1999) along with Maringe (2006), the location of the course seems to have little influence on prospective students' choice of degree course, despite location having a major influence on students' choice of university (Moogan *et al.* 1999; Bayne, 2001; Moogan *et al.* 2001, Souter and Turner, 2002 and Foskett *et al.* 2006). However, in this study, the location of the course stimulated a great deal of interest, amongst stakeholder and student respondents. This was unsurprising as undergraduate courses are run at universities campuses, thus assuming the location of the course also has an influence. The findings from the pre DCE research suggest out of twenty eight students that took part in the study as discussed in Chapter 5, only five wanted to remain at home, reinforcing students' previous comments in which they reported demanding quality and good value first year accommodation. Other results from the interviews suggested moving away to university equips students with the necessary skills to live away from home. However, all respondents reported that they wanted to move away to a city based university with good access to shops with no respondent indicating that they wanted to move to a campus based university. As detailed in Section 5.2.4 campus based universities are traditionally self-contained and located outside the city centre. The findings from this research support the general trend in the English HE sector with as few as eleven out of one hundred and twenty four English universities offering a campus based learning with the majority of courses being run in city centre based locations.

Once again as previously discussed in Chapter 5, more recent research (Paton and Prince 2011) suggests that the increase in fees might be deterring some students from moving away to university in order to reduce the overall cost of attending university. However, it is worth noting that this research was based on the old funding regime before the decision to increase fees to £9,000 maximum had been agreed. Nevertheless a 2009 study by Greenhalgh (2009) suggested that 36% of prospective students consider attending a university located closer to their family home in order to save the cost of their university education. The findings from the research reported here strongly supports this view with students stating that the distance from home is very important when choosing an undergraduate degree course. Perhaps it would have been expected that distance from home would be measured in miles rather than minutes; however, surprisingly both the stakeholder and student respondents considered distance from home to be measured in minutes rather than miles, with rail travel being the most preferred method of transport. The above emphasises commuting distance has a growing influence on prospective students' choice of undergraduate degree course with respondents reporting that on average they would be willing to travel between 45 and 180 minutes. To this end, the influence of distance from home on student choice of course should be explored since the decision was taken to increase fees up to £9,000 per year. The recommendations for future research will be discussed in Chapter 8.

Price: Again, no previous research into student choice of course had found price to influence student choice of course. Christie *et al.* (2001) indicated that the cost of attending university is often under estimated by prospective students. In fact, not all the student respondents admitted to considering the price of their course. At the time of the study, all universities operated a fixed price regime. Indeed, a number of respondents reported the location of the course to be more important than the actual price of tuition, suggesting price of fees not to be an immediate

issue. As expected, respondents from School **C** a private fee paying school claimed the cost of their course to be significantly cheaper than the cost of their current education.

This view is congruent with the work by Hossler and Hu (2000) and more recently Maringe *et al.* (2009) who noted that there was no evidence to suggest that any increase in the price of tuition would deter student choice. However, in contrast to this research other findings from the study in this thesis suggest respondents from School **B** were increasingly more worried about the mounting levels of debt if the price of tuition increased, describing the need to take out loans due to the fact their parents couldn't afford to support the cost of their degree course. In this case, all of the respondents suggested they would draw upon government loans to cover the cost of admission.

Despite this study being based on the old funding regime (based on the Higher Education Act 2004) more recent government reports and private sector research (as detailed in Chapter 1) suggest that students are becoming increasingly more sensitive to proposed changes to increase the price of tuition. Swaine (2009) along with Paton (2009a and 2009b) and Paton and Prince (2011) identified prospective students becoming increasingly more price sensitive in their decision to select an undergraduate degree course. When asked their opinion of the proposed plans to increase the price of tuition, students considered there was no reason to increase the price of tuition. In line with the most recent contributions, student respondents suggested that they would begin looking for alternative options such as immediate employment rather than applying to university, identifying that any rise in the price of tuition disagrees with earlier research (Hossler and Hu, 2000 and Maringe *et al.* 2009) about the influence of price. Paton (2009b) believes this is due to prospective students being put under increasing pressure by parents and stakeholders to really consider their decision

to attend university with the fear of facing as much as £40,000 worth of debt when they finish university.

An equally large challenge was to understand how much the respondents would be willing to pay before considering alternative opportunities. No existing extant research has examined the effect of price on choice of course but findings from the pre DCE study clearly indicate that if prospective students had to put a monetary value on how much they would pay for their degree course that on average students who receive monetary support from the government were willing to pay £2,300, a sum of £920 less than the current price. Respondents from School **C** indicated that they would pay as much as £8,000 and respondents from School **D** £5,600, a sum £2,375 more. It was also found that respondents from School **D** would pay an additional £1,800 for their ideal course with respondents from Schools **B** and **C** reporting that they would not pay any more. Other results show stakeholder respondents suggest students would pay on average up to £5,845, an additional £3,155 for their ideal type of course.

Quality of teaching: In their 1999 study into the factors that influence choice of course, James *et al.* (1999) indicated that the quality of teaching had a strong impact on prospective students' choice of course. In this case, student respondents supported this view suggesting quality of teaching to be very important. However, it was also noted that despite quality of teaching being important, students seemed to possess relatively little understanding of the meaning of it. In one suggestion put forward by students from School **C,** respondents indicated that good teaching quality was linked with entry requirements, with School **B** respondents also indicating smaller class sizes would improve the quality of teaching. The two points above confirmed more recent contributions by Foskett and Hemsley-Brown (2001) into university level student choice, which indicated the importance of quality of teaching, despite describing a sense of ambiguity as to how the term was measured.

Throughout all of the interviews, only one student knew about the old QAA approach to measuring quality of teaching, but reported knowing little about its underlying principles. Surprisingly, only a small number of students admitted to looking at league tables. However, closer examination revealed this to be post-application rather than pre-application. Findings from the students' interviews also suggested professional accreditations to increase the perception of a degree course quality of teaching. However when asked, none of the respondents could name an accreditation. In summary, the research undertaken in this study suggests that although the existing marketing literature on student choice regards quality of teaching as important, little remains known about how it can be measured. Nevertheless, Sastry and Bekhradni (2007) more recently identified the number of contact hours as part of a proxy to quantifying quality of teaching. The writers imply that on average students receive around 14 hours of teaching per week. Baker (2011) noted large class sizes and reduced contact time were causes of poor teaching quality.

Reputation: In Section 3.1 it was indicated that university reputation was considered a strong influence on student choice of institution, yet there was little discussion about how reputation influenced choice of course. James *et al.* (1999) suggested reputation to be more commonly linked to graduate employment. Findings from this study were in line with James *et al.* (1999) earlier work suggesting students from all three schools associate course reputation with graduate employment. Interestingly, stakeholders reject these comments suggesting course reputation is not a major influence on student choice of course, acknowledging students' preference for reputation has overlapping similarities with graduate employment.

Another factor that may explain the influence of reputation is the former binary divide between pre and post 1992 universities. At a broader level, Maringe (2006) noted that the type of university can have an influence on reputation at university

level decision making. In this case, student and stakeholder respondents considered a divide to exist between pre and post 1992 universities, with pre 1992 asking for higher entry requirements and having a better reputation. Other results from the interviews suggested respondents not reporting league tables as having an influence on course reputation.

In this case, the data collected failed to provide clear evidence that reputation is not related to graduate employment. As previously discussed, findings from this study appear to differ from James *et al.* (1999) and Maringe's (2006) argument that prospective students place great emphasis on graduate employment when choosing an undergraduate degree course, demonstrating neither graduate employment nor reputation to have an influence on student choice of degree course.

Safety: Although the existing literature does not acknowledge safety as being a core influence on student choice of course, Shanka *et al.* (2005) along with Abubakar *et al.* (2010) suggested there is growing attention towards students' safety within the international student choice literature. Yet respondents reported a sense of ambiguity towards the attribute 'safety', with none of the respondents indicating a consideration of safety before thinking about choosing a degree course. Respondents also commented that student safety was often media driven and when pushed, females did report considering their safety more than the male respondents. However, findings from these studies are not congruent with the Shanka *et al.* (2005) and Abubakar *et al.* (2010) contributions suggesting safety was not a major consideration when choosing an undergraduate degree course.

Type of course: In Section 3.1.1 it was indicated that only two studies had investigated the attributes that influence student choice of course, implying that very little is currently known about the attributes that affect students' choice of course. Consequently the decision to draw upon university level literature

revealed Felix Maringe to have undertaken primary research in Southampton into the attributes that influence choice of institution (Maringe, 2006). Findings from this research revealed type of course, defined through the length of an undergraduate programme, to be a major influence when choosing a prospective university. Despite respondents from School **B** reporting the length of course to have an impact on their choice of course, the majority of respondents dismissed length of course as a measure of type of course when choosing an undergraduate degree course. Nevertheless, throughout the interviews the structure of the course began to emerge to be a measure of type of course. In contrast to length of degree programme, the syllabus of the course was found to be a measure for type of course, with stakeholders believing students to pick undergraduate courses that could achieve the highest level of success. It is, therefore, possible that although the findings from this study are contextualised with the North-East of England that the syllabus structure replaces length of course when considering course level decision making behaviour.

The discussion within this section has provided detailed analysis of the attributes that are considered important when choosing a full-time undergraduate degree course. In particular this research contributes to the theory in the following way:

Despite interest in understanding the attributes that influence student choice, no previous research has defined the meaning of the attributes and elicited their associated values.

Maringe and Gibbs (2009) noted that research into the attributes that influence course level decision making remains in its infancy with only a very small number of previous contributions. Nevertheless, it is often evident that research into the attributes that influence student choice is conducted through surveys (James *et al.* 1999). For example Maringe (2006) reported the mean value of the attributes considered important when choosing a degree course. From a more qualitative

perspective, this pre DCE research allowed deeper meaning of the attributes to be unearthed. In line with DCE research (Louviere and Woodworth, 1983; Louviere *et al.* 2000 and Ryan *et al.* 2008a) the levels associated with the attributes were explored. Through undertaking qualitative research for the first time a set of attributes and levels that make up a consideration set within the 'search' phase of Hossler and Gallagher's (1987) model have been developed. In conclusion, the research conducted within this section has provided a new insight into the attributes that influence student choice of course. By systemically analysing the different attributes and identifying the most distinguishing themes this section has extended the current knowledge in the field and has provided a greater insight into defining the attributes instead of ranking them in order of preference.

7.3.2 The way forward ~ estimating the attributes that influence student choice

To date only two studies have estimated the attributes that influence student choice of course (James *et al.* 1999 and Maringe, 2006). However, this was done without any underlying theory and, therefore, the results from these two studies were unsupported (as discussed in Section 7.4). In direct response to the need to estimate the attributes that influence choice of course accurately based on underlying behavioural theory (as acknowledged in Section 3.1.4) this study used a DCE to measure the utility associated with these attributes. These attributes were outlined in Section **One** of the survey (as shown in Appendix N) and estimated using the conditional logit model (as discussed in Section 6.3). The results from Section **One** of the DCE revealed that the attributes that contain significant levels were 'quality of accommodation', 'distance from home', 'contact time', 'course structure' and 'cost'. The findings revealed 'quality of living' accommodation to have a significant influence at every level. This suggests that when students visit a potential institution more attention should be given to the

quality of university owned living accommodation as students who intend to live away from home place a great deal of importance on it.

Another attribute found to have a significant influence on student choice was distance from home. Despite the distance from home only exhibiting one significant effect, this revealed that prospective students were more interested in applying for a course that is located 180 minutes from the respondents' family home. In other words any course located further then180 minutes from the family home would have a negative influence on student choice. As previously highlighted in Section 5.3, the amount of contact time was used as a proxy for measuring quality of teaching. Sastry and Bekhradnia (2007) suggested that, on average, students receive between 8 and 22 hours per week. Nevertheless, respondents reported that on average they expect to receive 27 hours of teaching per week. On average, students expect twelve hours more per week than when they were in sixth form (www.education.gov.uk). This result also confirms Paton's (2011) recent argument that since the British Government's decision to increase tuition fees up to a maximum of £9,000 per year prospective students will demand more contact time. Other results from Section **One** of the DCE show that the attribute length of course exhibited significant values for, 4 year and 5 year theory based courses. Although it may be impractical for universities to combine the Scottish system, where an undergraduate and postgraduate course are combined (or similar to 'MChem' or 'MEng' courses provided in the existing English HE system), extra modules may be added to the undergraduate programme as a means of improving student satisfaction. This is discussed further in Section 8.2.7.

A major contribution of this study is that, although the Hossler and Gallagher (1987) model is used widely to explain student choice at a university level, there is no evidence that a similar theoretical model has been developed for course level decision making research. Very importantly the data gathered for the purpose of this thesis has been constructed using behavioural theory rather than using rating scales unlike previous published research (James et al. 1999 and Maringe, 2006).

By developing a DCE approach based on the Hossler and Gallagher (1987) model (as shown in Figure 7.2) for estimating the attributes found to be important from the qualitative study (as shown in Figure 7.3) this research presents an updated version (as shown in model 3 in Figure 7.4) of Hossler and Gallagher's (1987) model contextualised for this study. Based on final phase, 'choice' the model clearly identifies the five attributes have a significant influence when choosing an undergraduate degree course. The construction of this model provides a direct contribution to the extant published research, showing the attributes that influence student choice, estimated using sound behavioural theory.

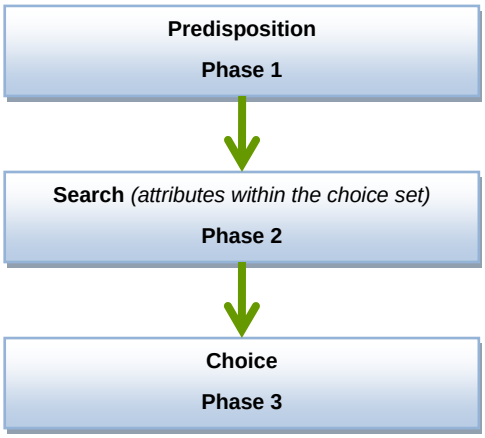


Figure 7.1: Model 1 ~ model from the literature (as shown in Figure 3.1)

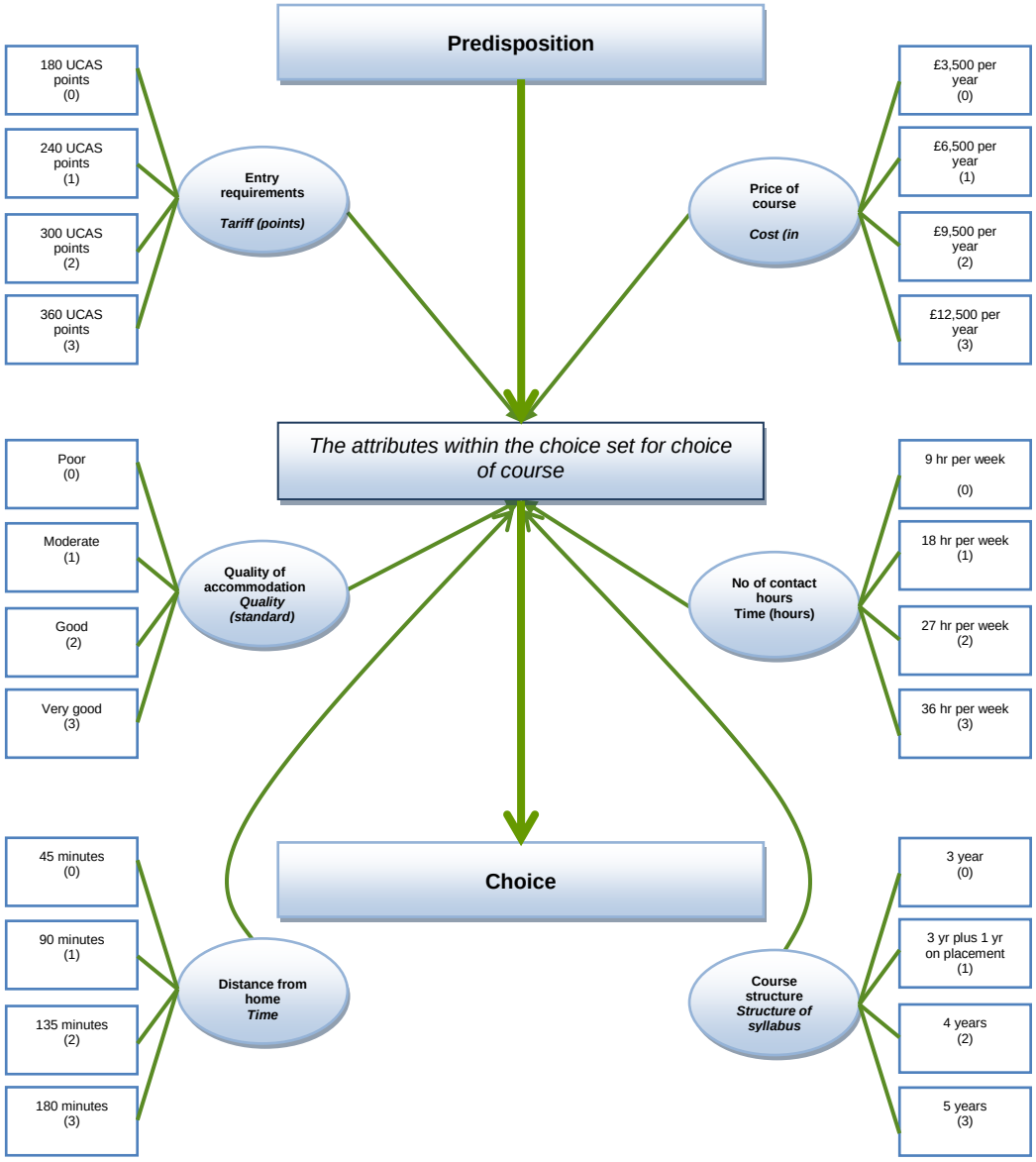


Figure 7.2: Model 2 ~ validated model based on a small qualitative sample (as shown in Figure 5.3)

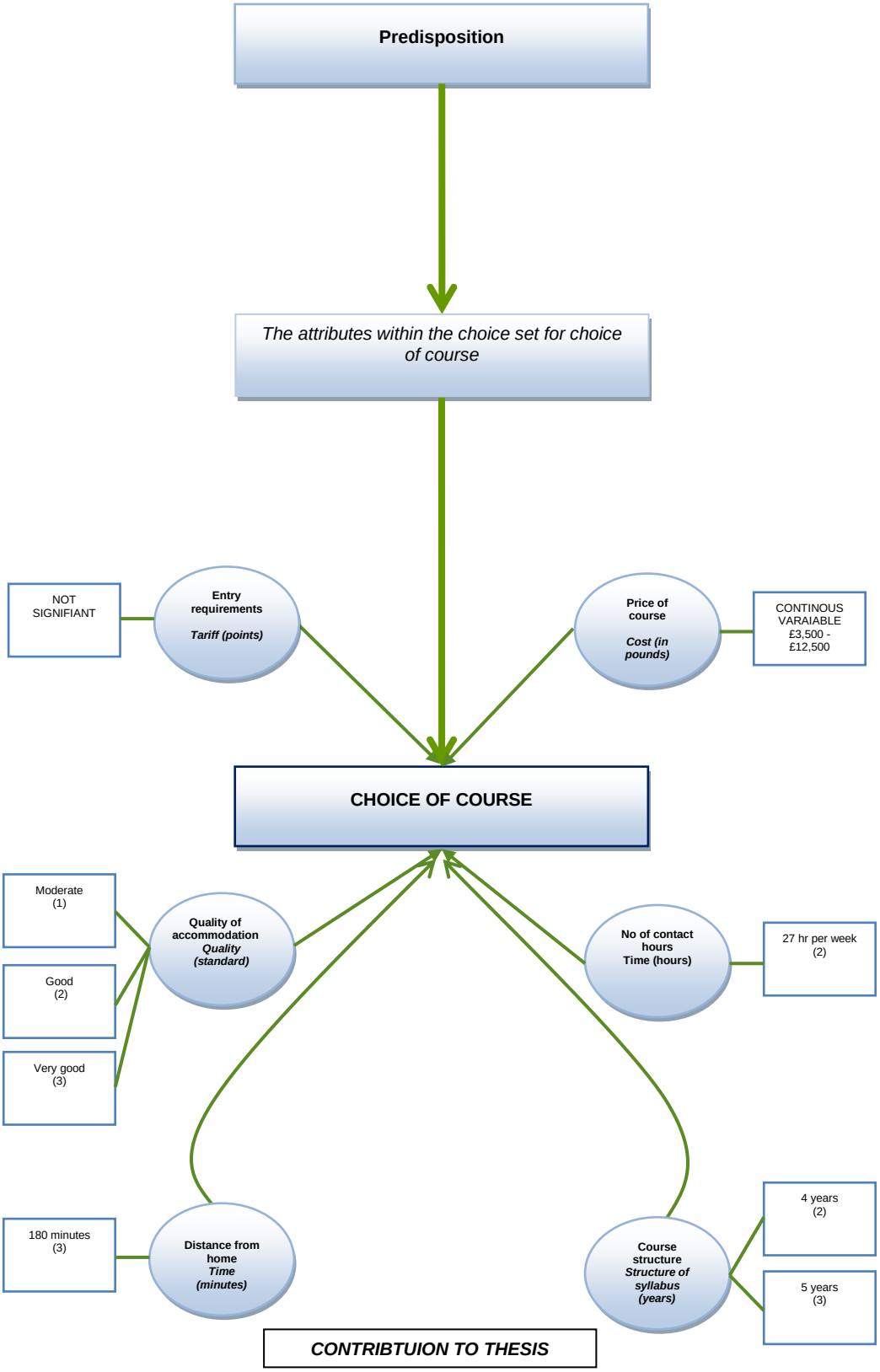


Figure 7.3: Model 3 ~ the attributes levels found to have a significant influence on student choice of course

In Chapter 5 it was also indicated that findings from the Stage 1 of the method (as shown in Figure 4.2) also placed an emphasis on the price of living accommodation as well as the overall quality. Section 6.1.2 described how the survey instrument was divided into three separate sections. In this case, given the pragmatic nature of the study a smaller DCE was developed to estimate the price of first year living accommodation. The results from this DCE were generated from Section **Two** of the survey instrument. Findings from this smaller DCE study suggest that it is possible that all five attributes are statistically significant (≤.005): location, internet access, access to en suite facilities, clean accommodation and cost all influence respondents choice of accommodation.

As a result of validating the attributes and levels this study has applied DCE research outside the scope of course level decision making and also explored the attributes and levels that influence choice of first year living accommodation. Whilst the attributes that influence choice of accommodation are not the main focus of this research, by developing a smaller DCE to estimate the attributes considered to influence student choice, this has added to the existing knowledge on how to estimate accommodation based decision making.

For the remainder of this section the approach to calculating student choice is now considered. Previous research (such as that reported in Section 3.1.3) has provided evidence that rating scales provide a theoretically unsupported and ad hoc approach to measuring the attributes that make up a course (or also known as an alternative). This section attempts to build upon the extant published research by examining if the development of discrete choice modelling would provide a theoretically alternative approach to estimating course level decision making behaviour.

Early research by Louviere and Meyer (1976) discovered the most common problems with rating scales were linked to their overall design. Friedman and Amoo (1999) argued that there were many ways in which the presentation of rating scales could cause biased results. Much of the previous literature recognised labelling (Schrauf and Navarro, 2005 and Dillman, 2008), language (Hodge and Gillespie, 2003 and Burns and Bush, 2010), type of contextual information (Smith, 1991 and Malhotra, 2004) and number of points (Churchill and Peter, 1984 and Dillman, 2008) all contribute towards eliciting biased results. Furthermore, Lockshin *et al.* (2007) described how rating scales are also influenced by cultural differences, in more polite cultures such as Asia where James *et al.* (1999) conducted the first study into the attributes that influence course level decision making; respondents refrain from using the lower end of scales to avoid causing offence.

Other methodological issues surrounding rating scales (as discussed in Section 3.1.3) concerned their inability to distinguish between the different levels connected with an attribute. Louviere (2000) describes levels as the various values qualitative or quantitative of an attribute. Flynn *et al.* (2007) identified that rating scales are unable to measure the different levels (or values) associated with an attribute, thus prohibiting respondents from constrcuting trade-offs between the required level of an attribute such as price or location. However, the main problem with rating scales was first highlighted in an article published in the *Journal of Marketing Research*. Louviere and Woodworth (1983) noted that it was impossible to estimate student choice behaviour with any certainty using rating scales as there is no formal theory connecting rating scales to consumer choices. In other words, it is impossible to estimate the attributes that influence student choice using a rating scale as the instrument has no formal connection with the student decision making process. McFadden (2001) noted that this problem could be overcome by drawing upon a technique that is based on rational behaviour

theory. As suggested by Louviere *et al.* (2000) the main approach to measuring consumer choice in the marketing field is choice-based consumer theory. Two approaches to choice-based consumer theory include continuous and discrete choice. Chandukala *et al.* (2007) described how discrete choice theory is preferred in marketing when consumers develop preferences for the purchase of a single item. In Section 2.3 it was identified that discrete choice preference can be measured through satisfying a set of axioms (or theoretical principles - Peter and Olson 2001). In this case, individuals are considered rational and construct decisions in order to increase the chances of receiving higher levels of utility (the definition of utility can be defined in the glossary of terms).

Findings from Section **One** of the DCE in Chapter 6 show only one attribute (facilities – quality of accommodation) is statistically significant (≤.005) in relation to respondent choice of course at every level. Moreover, for the attribute 'quality of accommodation' there is a linear relationship between utility and quality. In other words, as the quality of accommodation increases so do respondents' associated levels of utility (or desirability), showing estimates for this level to be consistent with a priori expectations (as detailed in Section 6.5). Findings in Chapter 6 also reveal this relationship to be apparent for the attribute 'price of fees'. The parameter estimate (-.0000695 at a 95% confidence level) shows a rise in the cost of tuition has a negative influence on respondents' utility when choosing an undergraduate degree. Moreover, as the price of a course increases, the less likely student respondents are to choose a degree course, further increasing the theoretical validity for the model.

The other assumption is that consumers have well defined preferences and when selected with two or more bundles of goods, they can select preference for one alternative over another. For example **Course A** over **Course B**. The findings from the parameter estimates in Chapter 6 show that respondents associate preference for different levels for the attributes 'distance from home' (180 minutes

≤.005), ‘contact time’ (27 hours per week ≤.005) and ‘course structure’ (4 year theory based ≤.005 and 5 year theory based ≤.005) revealing respondents to be able to ascribe preference for one level over another, therefore confirming the DCE developed within this research to satisfy the axioms that exist within the behavioural theory.

More recently Amaya-Amaya *et al.* (2008) argued that there are three further extensions to traditional discrete choice theory that are important when deciding to develop a discrete choice modelling approach. Lancaster (1966) dismissed the assumption that goods were direct objects of utility, rather that the attributes that make up a good represent the given utility. The findings from Section **One** of the DCE show respondents successfully ascribed utility to 5 of the 6 attributes that were found to influence student choice of a degree course (as detailed in Chapter 5). Similarly for Section **Two** respondents ascribed utility to all 5 attributes. These results prove that when estimating the utility for an undergraduate degree course the attributes that make up a course represent students’ utility rather than the whole course per se. In Chapter 2 it was also indicated that instead of students selecting an alternative (or in this case an undergraduate degree course) within an infinitely divisible space (as discussed in Section 2.3), choice of course can be made amongst a finite set of a mutually exclusive set of alternatives (Amaya-Amaya *et al.* 2008). Chapter Four described how both DCEs in Section **One** and **Two** were based on orthogonal fractional factorial designs (as discussed in Section 4.4.2) that only included a finite set of the total possible number of alternatives that could have been tested (for example in Section **One** a possible 4096 alternatives could have been used). As suggested by Louviere *et al.* (2000) in Section 3.6.4 fractional factorial designs based on orthogonal designs represent a subset of all possible attributes and levels to produce a finite set of mutually exclusive alternatives. Indeed, the results in Table 6.1 in Chapter 6 acknowledge that only 12 out of 218 respondents have managed to complete all

32 alternatives in Section **One**, with as few as 17 out of 213 respondents unable to complete all 8 alternatives in Section **Two**. Therefore, this confirms that most respondents can select a degree course based on a finite set of alternatives, thus satisfying the second extension associated with discrete choice theory.

The final extension to discrete choice theory dismisses claims that choice can be measured deterministically (as defined in Section 2.3 and represented in equation 1) and assumes a portion of consumers' choice to be probabilistic and therefore random. Based on Thurstone's (1927) theory of random utility theory, McFadden *et al.* (1986) argued that the idea behind random utility theory was that part of a consumer's utility was unobservable and therefore could not be measured deterministically. As presented in equation 1 in Section 2.3.1 this assumes that when measuring a consumer utility for the attributes that make up an alternative, both a systematic (observable) and random (unobservable) component are measured. In this case, only the likelihood rather than certainty of an attribute being chosen can be computed. Column 3 in Table 6.3 in Chapter 6 shows the results from the conditional logit model for the 6 attributes (as presented in Figure 5.3) in Section **One**. These results draw similarities with the Holdsworth and Nind (2005) study where a DCE was developed to investigate university level decision making and analysed using a conditional logit model. These estimates acknowledge the attributes that influence course level decision making behaviour can be computed using probability models rather than measuring choice deterministically. From this it is possible to see that the attributes that contain significant levels are 'quality of accommodation', 'distance from home', 'contact time', 'course structure' and 'cost'. Similarly in Table 6.9 the results from the logit model for Section **Two** also acknowledge that the attributes (as presented in Figure 5.3) that influence student choice of accommodation can be measured using maximum likelihood estimates (as detailed in Section 4.2.5.2). These results show that location, internet access, access to en suite

facilities, clean accommodation and cost all influence respondents choice of accommodation.

In conclusion, this section of the study has demonstrated how it is possible to satisfy the sound behavioural axioms of consumer choice in order to estimate theoretically the attributes that influence student choice of course. This section has justified how it is the first study to explore choice level decision making behaviour acknowledging that part of students' decision making is unobservable and therefore immeasurable. The inclusion of probability models has allowed the likelihood of utility associated with the attributes that influence student choice to be estimated. Finally, this section has shown how this is the only study to have developed a census in order to measure the total sixth form population of two North-East based secondary schools.

7.4 Objective 2 ~ Consumer reservation price

For this section, the reservation price estimates calculated from the DCE are revisited. As previously discussed in Section 3.5.1 more research is needed in the marketing field into 'indirect' approaches to estimating consumer reservation price. To date, the previous approach to estimating student reservation price has been constructed using a 'direct' approach that elicits price by targeting current undergraduate students. However, it is possible that using a direct approach prohibits the estimation of more theoretical accurate results. This section critically reviews the literature on estimating consumer reservation price and from that review puts forward an alternative approach to estimating student reservation price for the attributes that comprise a degree course.

As suggested by Kohli and Mahajan (1991) consumer reservation price can be determined by the utility towards a product in relation to the price and utility for the customer's most preferred product. For the current research, consumer

reservation price is represented as a monetary figure for the utility associated with the attributes that make up an undergraduate degree course and it is this view that underpins this study.

Despite the growing interest in tuition fee pricing (Maringe, 2006 and Maringe *et al.* 2009) only a small number of theoretical approaches have been developed to calculate students' reservation price. A theme identified in Chapter 3 describes that most approaches were more practice based or located outside the marketing field (Gabriele *et al.* 2008; Turner *et al.* 2000).

Nevertheless, Breidert *et al.* (2006) noted direct data estimates reservation price using actual market data. Wertenbroch and Skiera (2002) identified direct data to benefit from high levels of external validity drawing upon scanner and simulated information (as discussed in Section 3.2.1). Today, one rare example of research using direct data to estimate student reservation price for full-time undergraduate degree courses has been developed by OpinionPanel Research in London (OpinionPanel 2010). In February 2010 the private sector based group published a study reporting students' reservation price using a version of the direct approach technique known as the van Westendorp price sensitivity meter. Lyon (2002) noted that the technique which was originally developed in the 1970s targets existing customers to produce a range showing the lowest and highest prices students would be willing to pay to attend university. Breidert (2006) suggested how this involved asking respondents a series of four questions to discover a price bracket that respondents are willing to pay for their undergraduate degree course. However, despite the direct approach being located within the marketing field it has a number of problems associated with it. For the remainder of this Section these criticisms can be split into two main areas: the van Westendorp price sensitivity meter and generating the responses.

7.4.1 The van Westendorp price sensitivity meter

Much of the previous literature surrounding estimating consumer reservation price is highly critical of the van Westendorp price sensitivity meter. Bateman *et al.* (2002) noted that by directly asking students the minimum and maximum they would pay for 'tuition' places an unnatural focus on price; furthermore, increasing respondents' levels of cognitive strain. Indeed, Breidert (2006) noted that the van Westendorp approach can force students to provide an inaccurate reservation price. Nevertheless, the results from the DCE show that very few respondents (n) did not manage to complete Section **One** (n=12) and **Two** (n=17) of the survey instrument. The above point appears to be linked to Wierenga (2008) who argued when estimating student reservation price one solution would be to ask students to choose between two or more alternatives (as shown in Appendix N) both at different prices and see which course they prefer.

Another issue with the van Westendorp price sensitivity meter is that the approach provides respondents with little incentive to reveal their true reservation price. Nessim and Dodge (1995) revealed respondents were more likely to provide artificially lower prices in an attempt to keep prices low. Interestingly, Sichtmann and Stingel (2007) found the opposite problem that, in fact, reservation price estimates using the van Westendorp price sensitivity meter were highly likely to be affected by high levels of social pressure, thus causing students to overestimate their reservation prices. The above points seem to suggest that the direct approach is vulnerable to respondents manipulating their prices. In contrast to OpinionPanel's (2010) study, respondents in this study were never directly asked how much they would be willing to pay for an undergraduate degree course. Respondents' reservation price was calculated based on the choice sets (as shown in Appendix N). Therefore, by measuring respondents reservation price based on the preferences recorded in the survey avoided the threat of respondents providing artificially low prices.

Furthermore the van Westendorp price sensitivity meter fails to reveal monetary estimates for the individual attributes that makes up an alternative. However, the results from the survey research show that it is possible to ascribe monetary values to the attributes that make up a degree course. The attributes quality of accommodation ('Moderate' 'Good' and 'very good'), Distance from home ('180 minutes'), Contact time ('27 hours per week') and Course structure ('4 year theory based' and '5 year theory based') were all found to have a significant (≤0.005) influence on student choice of course and in turn allow reservation price to be estimated. This supports Lancaster's (1966) theory of choice that when calculating respondents' reservation price, the values are attached to the attributes that make up the product rather than the good per se.

7.4.2 Generating responses

When estimating students' reservation price for degree courses, OpinionPanel (2010) targeted current undergraduate students. Holdsworth and Nind (2005) noted the importance of targeting prospective students who had no previous experience in order to avoid the threat of bias. Closer inspection of their website shows OpinionPanel research group to have over 24,000 Year 12 and 13 students on their online data base; surprisingly, OpinionPanel ignored the need to target these students. It is possible that OpinionPanel's failure to target prospective students was brought about through the increasing pressure to finish the research. A review of OpinionPanel's team shows one of their non-executive directors also to be a leading Government advisor in strategic planning in English HE. It is possible that OpinionPanel combined this survey with ongoing research in order to be the first to offer reservation price research to put the business at a market advantage. Nevertheless, findings from the study presented here show that it is possible to estimate consumer reservation price using Year 12 and 13 students and that in order to avoid bias, prospective students should be targeted.

Finally, OpinionPanel (2010) identified a vast difference in what students were willing to pay in an unrestricted market. Findings revealed on average 80% of current students would not apply for their degree courses when the price of tuition was charged at £10,000 per year (OpinionPanel, 2010).

In contrast, the results from this study show that measuring respondents' reservation price indirectly translates their underlying preference to attend university to be worth £30,195. As previously described in Section 6.3.5 although this is not a figure that the respondents ascribed to and was calculated indirectly through the choices they made between 32 different degree courses (as presented in Appendix N) the results show that reservation price estimates can be calculated using prospective students. Furthermore, the monetary values assigned to the individual attribute levels (as illustrated in Table 6.6) shows respondents are willing to pay as much as £8,291 per year in exchange for very good quality living accommodation, a further £1426 more than current market price for very good quality living accommodation in Newcastle (UNITE, 2011). The findings from this research also reported respondents were willing to pay a further £3,600 per year to be enrolled onto a 4 year rather than 3 year degree programme. These results from this research appear to link with Holdsworth and Nind's (2005) earlier argument that when conducting student choice research studies should use prospective students in order to avoid post rationalisation, thus avoiding reservation price estimates being distorted by positive and negative experiences.

Although the direct approach had been used to target current students, there was no evidence of any previous research using an indirect approach to estimating consumer reservation price. In summary, the data collected from this study provides a major contribution that there is clear evidence that indirect approaches to measuring consumer reservation price offer a more theoretically sound approach over the direct technique. There is also little evidence to suggest that the van Westendorp price sensitivity meter estimates price based upon students' utility. In this case, price is estimated based on the maximum and minimum price they are willing to pay to receive the product. In other words the research by OpinionPanel (2010) seems to be at odds with recent contributions developed within the marketing literature.

7.5 Objective 3 ~ Designing a DCE

In this section the challenges of developing a DCE within marketing are revisited. As indicated in Chapter 3 there is a number of stages which are involved in designing a DCE. However, a review of the marketing literature shows very little evidence of a formal 'checklist' to follow when designing a DCE. Nevertheless, this section builds upon the extant published research in order to develop a DCE to elicit student utility indirectly for the attributes that comprise a degree course.

Much of the previous literature suggests that when developing a DCE, the process should begin by determining what type of choice experiment will be designed (Bateman *et al.* 2002 and Lancsar and Louviere, 2008). Street and Burgess (2007) noted this can either be through multinomial or binary designs. In contrast, the current study found that before the type of design could be determined the attributes and levels had to be discovered. However, in this case the extant published research provided very little guidance on how this could be undertaken (Coast and Horrocks, 2007). Louviere (2000) along with Pitchforth *et al.* (2007) noted the benefits of undertaking qualitative research. Nevertheless,

previous research provides little evidence of the required ethical procedures or of analysing the data. Throughout the interviews, respondents commented on the attributes and levels that influence student choice (as discussed in Section 7.3.1). However, it was interesting to discover that both 'price and quality' of living accommodation were found to be distinguishing themes for attribute 'facilities'. Given the objective nature of this research the decision was taken to examine both themes by constructing multinomial and binary designs. In terms of this study, the above approach seems to dismiss Bateman *et al.* (2002) along with Lancsar and Louviere's (2008) claims that the design has to be decided before the attributes and levels have been discovered.

Previous studies have provided evidence that once the attributes and levels along with the design of the study have been discovered, the choice sets can be developed. In Chapter 3 it was indicated that in order to develop choice sets, knowledge of experimental design theory was required. Louviere and Flynn (2007) suggested that experimental design theory be used to provide the means to select subsets of the total set of possible alternatives for use in an experiment. In this case choice sets could be constructed through factorial and fractional factorial designs (Louviere *et al.* 2000). However, the results from this study revealed that a factorial design is too large, acknowledging the need to construct fractional factorial designs. This view supports Bateman *et al.* (2002) along with Amaya-Amaya *et al.* (2008) who found fractional factorial designs to be increasingly more practical, particularly when undertaking constructing DCEs with a large number of attributes and levels.

Next the efficiency of the design can be examined (as described in Section 3.6.4). As suggested by Huber and Zwerina (1996) four tests can be taken to check the efficiency of the design. These are 'orthogonality, utility balance, minimal overlap and level balance'. In contrast the current study suggests orthogonality, minimal overlap and level balance to be adequate tests to ensure

the efficiency of the design. Lancsar and Louviere (2008) noted that utility balance can only be checked with access to specialist software. This links with Ryan *et al.* (2008b) study that on average as few as 5% of published DCE research checks for level balance, implying that only three of the four tests are required.

Following this, the literature notes that the number of choices should be considered (Ryan and Skåtun, 2004). This involves deciding whether to give respondents the option of opting out of answering the choice sets. However, findings from this study were that the decision whether to incorporate an opt-out was taken when analysing the qualitative data. Therefore, although supporting the published research in using the opt-out, the consideration of choices was made at the beginning of the study.

Indeed Louviere (2000) noted that once the DCE has been constructed the decision should be to pilot the survey instrument. This linked with Wagner *et al.* (2000) who acknowledged the need to pilot DCE research in order to ensure that the right number of attributes and levels are included in the study. In total three pilots were developed with academics familiar with survey research along with 40 prospective students. This follows Hensher *et al.* (2005) argument that between 30-40 respondents should be targeted when piloting the study in order to provide a feasible chance of receiving valuable data.

Following this, the findings in this study support the previous research in deciding upon the method of distributing the surveys. Louviere *et al.* (2000) identified the advantages of using self administered questionnaires when collecting data.

In summary, this research provides evidence that published research provides a feasible approach to developing a DCE. Although previous research gives some guidance there is no evidence of a formal checklist when undertaking DCE research in marketing. By constructing a checklist (as shown in Table 7.1) a

contribution can be made that provides a formal structure to developing DCE research in the marketing field.

Table 7.1: A checklist containing the factors to consider when constructing a DCE from a marketing perspective

Stage 1 ~ Pre DCE study (determining the attributes and levels)	*How will the attributes be derived?* Will they be guided by the existing literature? Is there a need to collect qualitative data? If so, who will you target and are they accessible? Are they under the age of 18 years? If so what steps have been taken, such as securing a Criminal Records Bureau check? *What ethical procedures are there in place?* Is a meeting required in advance before collecting the data? Where will the information be obtained e.g. in office or school? How long do you expect the data collection process to take? Will an interview schedule be constructed? Will price be included? Will an appropriate payment vehicle be explored? *How will the levels be derived?* Will they be guided by the existing literature? If not, how will respondents be encouraged to speak about the levels? *How will the data be recorded?* Have you got permission to record the data? How will the data be transcribed e.g. Naturalism or Deneturalism? Where will the data be stored? Physically or electronically? *How will the data be analysed?* How will the themes be identified from the data? Is there more than one person analysing the data? Will an appropriately robust model be followed in order to reduce, display and analyse the data? What demographic information is required in order to analyse the data? Will the data be coded to ensure respondent (s) anonymity?
Stage 2 ~ Constructing the questionnaire	*What type of design will be incorporated? Full factorial? Fractional factorial?* If deciding to use a fractional factorial design, how will the design be sourced e.g. Sloan's website If deciding to use a fractional factorial, what effects will be estimated? Main effects? Main effects plus higher order interactions? *What type of design will be used?* Multinomial or binary design? If deciding to use a multinomial, will an opt-out be included? What are the properties of the design and which will be assessed? Orthogonality? Level balance? Utility balance? Minimum overlap? How will the choice sets be assembled? Manually or electronically? How many choices sets will be included in the questionnaire?

	Degree of freedom? *How will the questionnaire be developed?* What size will the questionnaire be printed e.g. A4? Will a title page be included? What font will be used? Will an appropriate level of contextual information be given? Will instructions be provided? Is there a need for a key? Will an example question be provided?
Stage 3 ~ Piloting the questionnaire	Where will the pilot be held? Who will take part in the pilot exercise? Will more than one pilot exercise be required? How will the attributes and levels be checked? How easy is the questionnaire to complete? Approximately how long will it take to complete the questionnaire?
Stage 4 ~ Data collection	Who is the target population? Are they accessible? Is a sample of the population required? If so, what Type of sampling procedure will be developed? Census, probability or non probability? What has been the average number of respondents in similar studies? Are any further ethical procedures required? *(If so, revisit the questions asked in Stage 1)* How many questionnaires will be printed? How will the questionnaires be distributed? E.g. paper, mail or online? Where will the questionnaires be distributed? What is an acceptable response rate?
Stage 5 ~ Statistical analysis	Where will the data be stored? How will the data be uploaded? What coding mechanism will be developed in preparation for analysing the data? Will the data be uploaded by a research assistant? What software will be used to hold the data? What dedicated software package will be used to interpret the data? E.g. Stata or SAS What type of probability models will be used to analyse the data? E.g. conditional logit, binary logit etc? What does the demographic data show? Which attributes are discovered to be statistically significant? What attributes were reported positive or which were negative? What is the probability of take-up? What are respondents reservation price? Which goodness-of-fit tests will be developed? Has the odds ratio being calculated? How will validity be checked? How are the reported results? Are these inline with *a priori* expectations?

7.6 Chapter Summary

This chapter has examined the similarities and differences between the findings and extant literature. Following a preliminary review of the contributions developed from this thesis, attention turned to revisiting the objectives of this study. The context of the study was discussed. The attributes that influence student choice were then synthesised, recognising contributions to knowledge. A conceptual model (as shown in Figure 7.4) was then presented based on the attributes that influence choice of course. Following this, the theoretical properties of DCE were discussed, recognising the DCE to satisfy the axioms of behavioural theory. This led to the application of using DCE to estimate student reservation price to be discussed. The chapter concluded with a discussion of the procedures (as outlined in Table 7.1) involved in developing a DCE.

The following chapter draws an end to the thesis by summarising the areas for future research and the contribution to knowledge.

Chapter Eight

Conclusion

8.0 Introduction

This section draws a conclusion to this Doctorial investigation. The specific objective of this chapter is to present the contributions from this study and comment on the implications of these findings in order to make recommendations for future research. The chapter begins by discussing how the research fulfilled the research objectives. Due to the contemporary nature of the study, several practical recommendations are made that North East of England universities may wish to consider when marketing their undergraduate programmes. The chapter then re-addresses the original contribution to knowledge along with the limitations of the study. Areas of further research are then discussed before suggesting several lessons for new researchers in the field. The chapter concludes with a reflection of the challenges of completing this piece of research.

8.1 Addressing the researchable question and research objectives

The researchable question for this thesis was: *"How can discrete choice experiments provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education?"*

This section reviews the objectives presented in Section 1.4.

Research objective 1: To explore the consumer behaviour theory in relation to decision making and outline the underlying principles of discrete choice theory (Chapter 2).

Chapter 2 provided an introduction to the theory of consumer behaviour. Following a review of the different stages of the consumer decision making process (as represented in Figure 2.1) Section 2.3 narrowed the focus of the

study in relation to choice. According to the theory of consumer behaviour, choice can be defined as choices a consumer makes between two or more alternatives. This led to a review into the theory of consumer choice and more specifically discrete choice theory. This highlighted the importance of random utility theory (Thurstone, 1927) when estimating choice behaviour, acknowledging part of consumers' preference for an alternative to be unobservable.

Research objective 2: To critically review the student choice literature and explore the attributes that influence student choice and whether the development of discrete choice modelling would provide a theoretical alternative approach to using rating scales when estimating course level decision making (Chapter 3)

Chapter 3 begins with a review of the student choice literature was presented with an emphasis on examining course level decision making behaviour. Once a review of the course level research had been presented the attributes that influence student choice of course were discussed, acknowledging very little published work in this area (James *et al.* 1999 and Maringe 2006). Although previous research into course level behaviour (James *et al.* 1998 and Maringe, 2006) had targeted prospective students, closer inspection of this research revealed that it failed to measure the attributes that influence student choices, in a theoretically accurate manner. As detailed in Section 3.1.3 James *et al.* (1999) and Maringe (2006) failed to acknowledge the theory of consumer choice.

Research objective 3: To review the literature on estimating consumer reservation price and propose an alternative approach to estimating student reservation price for the attributes that make up a degree course (Chapter 3).

Later on in Chapter 3 the term willingness-to-pay is replaced with consumer reservation price in line with the discipline domain. Consumer reservation price

was defined as the monetary figure for the utility associated with the attributes that make up an undergraduate degree course. Consequently, a review of the various approaches to estimating consumer reservation price was presented. Findings from this review highlighted a number of criticisms associated with the existing theoretical techniques. The main criticism was that existing approaches to measuring student reservation price failed to elicit student behaviour based on the theory of consumer choice. Thus, in order to consider an alternative approach to estimating consumer reservation price, indirect approaches were reviewed with an emphasis on discrete choice experiments (DCEs). Louviere (2000) described how DCE was the only approach used to calculate consumer reservation price that was underpinned by discrete choice theory. Despite originally being developed in marketing (Louviere and Woodworth, 1983), much of the DCE research has been published outside the marketing field. Indeed, to date, no previous research in marketing has used DCEs to estimate students' reservation price for full-time undergraduate degrees. The chapter concluded with a review into the guiding principles of DCE research.

Research objective 4: To develop a discrete choice experiment to indirectly elicit student utility for the attributes that make up a degree course (Chapter 4).

Chapter 4 provided a clear insight into the methodological approach taken along with details of data collection methods used. Primary data was collected using survey research. The survey was developed over five stages. First, a small amount of qualitative research (as discussed in Section 4.2.1) was collected in order to validate the attributes and levels (as displayed in Figures 5.4 and 5.5). Given the findings from this pre DCE study along with the objective nature of this research the survey comprised two DCEs. Section **One** contained the attributes that influence student choice of course, with a smaller DCE being developed in Section **Two** comprising the attributes that influence student choice of living

accommodation. Later experimental design theory for Sections **One** and **Two** was used (as detailed in Section 4.2.2) in order to create the choice sets (questions). Once the properties of the DCEs had been tested (as shown in Appendix H and L) the survey instrument was piloted in the North-East of England (as discussed in Section 4.2.3) before a census was conducted in two Newcastle based secondary schools. The data was uploaded onto Stata dedicated statistical software before being analysed using conditional logit and logit models (as discussed in Sections 4.2.5.2 and 4.2.5.4).

Research objective 5: To explore the attributes and levels that influence student choice of undergraduate degree course (Chapter 5).

Chapter 5 presented the results from *Stage One* of the method (as shown in Figure 4.2). The aim of this stage was to investigate respondents' understanding of the attributes and whether they reflected what has emerged from the extant published research. Voluntary participants were selected from the extant literature and comprised Year 12 and Year 13 students interested in attending an English university and stakeholders recognised to have an influence on the decision making process (Section 4.2.1 dealt with how these were selected). In order to get a broad range of levels, secondary schools with different economic status based in the Newcastle area were selected (as shown in Table 5.1). In total, 4 focus groups were administered, with participants asked to discuss the 9 attributes and levels as presented in Figure 2.3. Once the focus groups had finished, 5 face-to-face interviews were conducted with stakeholders of HE (as shown in Table 5.2). As with the focus groups, stakeholders were asked to discuss the attributes and levels identified from the extant published research. Data was analysed using the Miles and Huberman (1994) model of data analysis. From the data analysis it emerged that 6 of the 9 attributes were considered to influence student and stakeholder choice, 'entry requirements, quality of accommodation, distance from home, the amount of contact time, the structure of

the course and price of fees'. However, it was also found for the attribute 'facilities' that participants ascribe preference to both 'quality and price' of first year living accommodation. In order to capture the significance of both variables the decision was taken to construct two DCEs. This made up Sections **One** and **Two** of the survey instrument as discussed for Research Objective 4.

Research objective 6: To statistically analyse the findings taken from the DCE in order to provide an insight into the student preferences and reservation price estimates for the attributes and levels identified within the literature and validated within Chapter 5 in relation to the underlying constant.

Chapter 6 presented the findings from the survey instrument. Initially the demographic data was presented in order to provide a general introduction to the chapter. From here the results for Section **One** of the survey were analysed using the conditional logit model. Seven steps of analysis were used to examine the data (as illustrated in Section 6.3). Findings from the conditional logit model show 5 out of the 6 attributes to have significant levels (≤0.005). These are 'quality of accommodation', 'distance from home',' contact time', 'course structure' and 'cost'. This allowed the other types of analysis to be estimated, including direction of effect (as shown in Section 6.3.3), probability of take-up (as shown in Section 6.3.4), reservation price, goodness of fit (as shown in Section 6.3.5) and odds ratio (as shown in Section 6.3.5). Following this, attention turned towards analysing the data from Section **Two** of the survey. Data was analysed based on the logit model for the attributes (as shown in Table 6.9) that influence student choice of living accommodation. Closer inspection revealed all five attributes to have significant (≤005) influence on student choice of rented accommodation. Despite the probability of take-up being unable to be estimated when using a logit model, this meant the direction of effect (as shown in Section 6.4.2), respondent reservation price (as shown in Section 6.4.3), goodness of fit (as shown in

Section 6.4.4) and odds ratio (as shown in Section 6.4.5) could be estimated. The chapter concluded by checking the internal validity of the survey instrument, revealing the data to be in line with *a priori* expectations.

Research objective 7: To critically evaluate the findings taken from the discrete choice experiment together with the existing marketing literature in order to develop and present contributions from the study (Chapter 7).

Chapter 7 discussed the contribution of this research along with comparing the findings taken from developing the DCE with the published research. This thesis has presented a detailed insight into administering a DCE with prospective students wanting to attend English universities. The chapter is based on the research objectives outlined in Section 1.4. The chapter begins by comparing the attributes and levels identified from *Stage One* of the method (as illustrated in Figure 4.2) with the existing consumer behaviour literature. A number of similarities are found and an adapted version of Hossler and Gallagher's (1987) student choice model is presented. Following this, the findings from the research acknowledge the DCE to be a theoretically accurate approach to estimating course level behaviour. Consumer reservation price estimates are then discussed before presenting a methodological check list to assist new DCE researchers in the marketing field.

8.2 Practical recommendations for English universities

Due to the practical significance of these results it makes sense to outline a number of practical recommendations to assist North-East of England universities in marketing their full-time undergraduate degree courses.

8.2.1 Student recruitment

In order to recruit prospective students onto their undergraduate degree programmes it is important that universities work to attract students nationally. Whilst research has shown that location is an important consideration when choosing a degree course, modelling student preferences reveals (as illustrated in Table 6.3) that a course located more than 180 minutes from the student's family home is seen to have a negative influence on the students' choice of course. One suggestion would be for university marketing departments to work more closely with secondary schools and further education colleges that are located less than 180 minutes from the university campus, further highlighting awareness for courses to students who live close to the university in order to attract and retain a greater number of prospective students.

8.2.2 Promote university living accommodation

Linked to the above, respondents placed much importance on securing high quality living accommodation. Closer examination of respondents' preferences indicated that the significance of quality of accommodation has a very strong influence on their overall choice of course. These findings have uncovered that despite the rise in the cost of living, respondents are keen to move into rented accommodation and develop their independence. The significant positive parameter estimates associated with quality of rented accommodation suggest the decision to consider the quality of rented accommodation has a very strong influence on prospective students' preferences. In 2009 it could have been recommended that universities invest in creating high quality accommodation with access to ensuite facilities, internet access, proper management and

cleanliness and a convenient location close to the university campus. In order to improve the chances that students will select their institution, accommodation services should work closely with the university marketing managers in order to promote high quality university owned accommodation; therefore, allowing English universities to secure higher income streams.

8.2.3 Promote teaching quality

The findings from this research also revealed quality of teaching has an extremely positive influence on respondent preferences when choosing a degree course. The findings from the research clearly show respondents want a course that offers 27 hours of contact time per week. However, since 2009, Government figures published in 2011 show £2.9 billion pounds being cut from university budgets, acknowledging English universities to have fewer resources to employ academic staff. One suggestion would be for English universities to encourage more of their research students to take on teaching commitments in the hope of securing firsthand teaching experience. Employing research students to cover and further increase the number of teaching hours students receive, would offer a more cost effective approach to fulfilling students' needs.

8.2.4 Extending university courses

Whilst respondents dismissed standard 3 year long degree courses, 4 year and 5 year courses were shown to have a positive influence on respondent choice of course. The findings uncovered when modelling respondents' preferences found that students rejected 3 year and 4 year courses that included one year on placement for longer theory based courses. This trend follows Scottish undergraduate degree courses that combine undergraduate and postgraduate qualifications into a single degree course. However it may be impractical to expect English universities to combine undergraduate and postgraduate courses but instead add additional modules to their undergraduate courses that would

increase student learning and have a positive impact on improving student satisfaction.

8.2.5 Charge higher prices

The most sensitive recommendation put forward by this thesis concerns the price charged for full-time undergraduate degree courses. It is clear from looking at the underlying constant (as highlighted in Section 6.3.5) that respondents have a very strong desire to attend university. However, it is important to note that this constant term was not a price the respondents ascribed to and, therefore, it cannot be assumed that respondents will pay £30,159 for a place on degree course. Nevertheless, it can be seen from closer inspection of the data (as shown in Table 6.4) that price becomes a negative effect once fees are higher than £12,500 per year, suggesting there is scope to increase the price of fees to £12,500 per year before price has a negative influence on student choice.

8.2.6 Accept the need to revisit entry requirements are marketed

Less emphasis could be placed on the number of entry requirements needed to gain entry onto a degree course. Findings from this research show entry requirements within the census not to have a significant influence on respondents' choice of course.

8.2.7 Universities to provide clean accommodation and internet access

The results from Section **Two** of the DCE also indicated that on average cleanliness has the most significant influence on student choice of accommodation. By ensuring university accommodation is well maintained and regularly cleaned, universities could ensure accommodation is kept to a high standard. Such an approach would ensure that on university open days prospective students visiting the university could see firsthand the high levels of cleanliness the university accommodation provides; therefore, improving the chances that students will choose to rent university owned accommodation.

Linked to the above, universities could also provide internet access to its student residence. Whilst research has shown cleanliness to have the highest level of significance, internet access was also indicated as having a large influence on students' choice of accommodation. To satisfy this demand, the university I.T Team could provide Wi-Fi facilities in all university owned accommodation. This would mean that students could use the internet without incurring any additional costs.

8.3 Summary of contributions to knowledge

The research presented in this thesis responds to calls by Maringe (2006) and more recently Maringe and Gibbs (2009) that further research is required into course level decision making behaviour. As previously discussed in Chapter 7 this research has contributed to the extant research in the following ways:

1. **This study has contributed to the existing body of knowledge through examining the attributes that influence course level decision making behaviour. Despite extant research focusing on access and means on stimulating private investment, this research has reacted to calls from Browne (2010) to identify the attributes that prospective students consider important when choosing a full-time undergraduate degree programme in England.**

2. **The qualitative element of this research has furthered knowledge into the meaning of the attributes and their levels, which can be used in future choice research. This study acknowledges six of the nine attributes to be considered important when choosing a degree course, finding similarities with the existing published research. Nevertheless, this study adds to the knowledge base by revealing the values attached to these attributes (as discussed in Section 7.3)**

3. **Despite broader published research being based on Hossler and Gallagher's (1987) model (as recognised in Figure 2.2) of student choice, today no model has been developed to guide course level research. The focus of this research was to use Hossler and Gallagher's (1987) model as a foundation to build upon the existing contributions in the field by investigating whether DCEs can provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education. As detailed in Section 3.1 the model comprises of three phases, predisposition, search (for attributes with the choice sets) and choice. As discussed in Section 7.3.1 preliminary qualitative research focused on the second phase (search) in order to present six attributes each with four levels that prospective students consider most important when choosing a degree course. Indeed, this led to the attributes and levels that have a significant influence on student choice to be identified. These attributes and levels represent the first theoretical model based on Hossler and Gallagher (1987) model of student choice to explain course level decision making behaviour. Therefore the construction of a theoretical model that presents the attributes and levels that influence prospective students' choice of degree course provides a new insight to the factors that are important when applying for a full-time undergraduate degree programme in England.**

4. **Whilst the attributes that influence choice of accommodation are not the main focus of this research, by developing a smaller DCE to estimate the attributes considered to influence student choice, this has added to the existing knowledge on how to estimate accommodation based decision making.**

5. **By developing a DCE, opposed to a rating scale approach that has dominated previous course level decision making, this has enabled the attributes and monetary values to be estimated. Whilst care must be taken when interpreting the reservation price results (as detailed in Section 3.5) due to the size of the underlying constant (as detailed in Section 6.3.5), this research has provided a new insight into the monetary values prospective students attach to the attributes that comprise an undergraduate degree course.**

6. **The decision to investigate student choice using a DCE generates awareness of the benefits associated with DCE research. Whilst most DCE research has been developed outside the marketing field this study provides a new insight (as shown in Table 8.1) into conducting DCE research from a marketing perspective.**

Table 8.1: A checklist containing the factors to consider when constructing a DCE from a marketing perspective

Stage 1 ~ Pre DCE study (determining the attributes and levels)	*How will the attributes be derived?* Will they be guided by the existing literature? Is there a need to collect qualitative data? If so, who will you target and are they accessible? Are they under the age of 18 years? If so what steps have been taken, such as securing a Criminal Records Bureau check? *What ethical procedures are there in place?* Is a meeting required in advance before collecting the data? Where will the information be obtained e.g. in office or school? How long do you expect the data collection process to take? Will an interview schedule be constructed? Will price be included? Will an appropriate payment vehicle be explored? *How will the levels be derived?* Will they be guided by the existing literature? If not, how will respondents be encouraged to speak about the levels? *How will the data be recorded?* Have you got permission to record the data? How will the data be transcribed e.g. Naturalism or Deneturalism? Where will the data be stored? Physically or electronically? *How will the data be analysed?* How will the themes be identified from the data? Is there more than one person analysing the data? Will an appropriately robust model be followed in order to reduce, display and analyse the data? What demographic information is required in order to analyse the data? Will the data be coded to ensure respondent (s) anonymity?
Stage 2 ~ Constructing the questionnaire	*What type of design will be incorporated? Full factorial? Fractional factorial?* If deciding to use a fractional factorial design, how will the design be sourced e.g. Sloan's website If deciding to use a fractional factorial, what effects will be estimated? Main effects? Main effects plus higher order interactions? *What type of design will be used?* Multinomial or binary design? If deciding to use a multinomial, will an opt-out be included? What are the properties of the design and which will be assessed? Orthogonality? Level balance? Utility balance? Minimum overlap? How will the choice sets be assembled? Manually or electronically? How many choices sets will be included in the questionnaire? Degree of freedom? *How will the questionnaire be developed?* What size will the questionnaire be printed e.g. A4? Will a title page be included? What font will be used?

	Will an appropriate level of contextual information be given? Will instructions be provided? Is there a need for a key? Will an example question be provided?
Stage 3 ~ Piloting the questionnaire	
	Where will the pilot be held? Who will take part in the pilot exercise? Will more than one pilot exercise be required? How will the attributes and levels be checked? How easy is the questionnaire to complete? Approximately how long will it take to complete the questionnaire?
Stage 4 ~ Data collection	
	Who is the target population? Are they accessible? Is a sample of the population required? If so, what Type of sampling procedure will be developed? Census, probability or non probability? What has been the average number of respondents in similar studies? Are any further ethical procedures required? *(If so, revisit the questions asked in Stage 1)* How many questionnaires will be printed? How will the questionnaires be distributed? E.g. paper, mail or online? Where will the questionnaires be distributed? What is an acceptable response rate?
Stage 5 ~ Statistical analysis	Where will the data be stored? How will the data be uploaded? What coding mechanism will be developed in preparation for analysing the data? Will the data be uploaded by a research assistant? What software will be used to hold the data? What dedicated software package will be used to interpret the data? E.g. Stata or SAS What type of probability models will be used to analyse the data? E.g. conditional logit, binary logit etc? What does the demographic data show? Which attributes are discovered to be statistically significant? What attributes were reported positive or which were negative? What is the probability of take-up? What are respondents reservation price? Which goodness-of-fit tests will be developed? Has the odds ratio being calculated? How will validity be checked? How are the reported results? Are these inline with *a priori* expectations?

8.4 Research limitations

As previously mentioned in Section 4.5 there are a number of limitations associated with this research. Lancsar and Louviere (2008) suggest this is normal as developing such an approach is considered extremely complex and requires many attempts before the analyst can become familiar with DCE approach.

8.4.1 Identifying the attributes and levels

One of the main problems with designing the pilot study was the lack of theoretical guidance. Despite the growing rise in DCE research, previous contributions fail to provide a clear insight into how to approach collecting the attributes and levels. The published research recommends the use of qualitative research (Lancsar and Louviere, 2008). This resulted in a great deal of time being invested into developing a plan for validating the attributes and levels (as detailed in Section 4.2.1) along with exploring techniques for collecting and analysing qualitative data. The lack of guidance also meant that more time was required to conduct the pre DCE work. In hindsight it may have been better to have started the qualitative research several months earlier. This would have allowed additional time for collecting the data.

There is also very little existing literature in relation to the attributes that influence course level decision making. To date only James *et al.* (1999) and Maringe (2006) have conducted research in this area. As a result, contributions had to be taken from the broader university level student choice literature in order to present a set of initial attributes to the participants (as illustrated in Figure 2.3).

Two types of participants were were identified as discussing the attributes that are include within recruited for the interviews. Both prospective students and stakeholders of HE a choice set (as shown in Figures 5.4 and 5.5). However, in order to target both groups' of participants' two types of interviews had to be

conducted. This meant that additional time had to be spent researching focus group and face-to-face interview techniques. Therefore, caution must be exercised when recruiting research participants as different groups may require different interview techniques. It can also be recognised that none of the participants included in the study attended a faith school (e.g. such as Roman Catholic). Despite efforts to try and arrange a focus group at a faith school a suitable time was unable to be arranged. However, James *et al.* (1999) and along with Maringe (2006) found no evidence to suggest faith was a discriminator on student preferences.

All interviews took place in the North-East of England. This was due to the researcher being based in a North-East university. If resources had allowed it may have been worth contacting secondary schools outside the area in order to provide a broader perspective to the study. However, there is a great deal of difficulty in contacting schools outside the region and beyond the scope of this particular research project.

Cards were given to the participants at the start of the focus group. These cards included the attributes that the literature considers influential on student choice of course. As the participants were gathered together in a group this provided little time for the individual participants to read and reflect the cards. It is not known how the participants would have reacted to the cards if they had been given a list of the attributes in advance. If this exercise was to be held again it may be worth providing a list of the attributes to the students before the date of the interview in order to give the students time to think about their overall importance. However, any operational changes while undertaking this study would have to be approved by Northumbria University Ethics and be well planned in advance.

8.4.2 Modelling student preferences

The limitations for this study can be divided across four areas; questionnaire design, target population, distributing the questionnaire and statistical analysis.

I. Questionnaire design

There was a number of problems with the design of the questionnaire. A closer inspection reveals these problems are more commonly associated with **Section Three** of the survey. The problems with these questions are not reproduced here as they have already been discussed in Section 4.5.2. However, issues concern the wording of questions, specifically in relation to questions 4, 5, 6 and 10. In hindsight more time should have been spent uploading the data and running the entire data analysis. However, as mentioned, this was not possible due to not having access to the dedicated computer software 'Stata'.

II. Target population

One of the main problems concerning the distribution of the questionnaire was that it was only aimed at state school students. Although fee paying students were involved in *Stage One* of the method (as discussed in Section 4.2.1), fee paying prospective students were not asked to take part in completing the survey. This was due to only a small number of public schools being based in the area and the total target population being small. Therefore, there is no record of how fee paying student preferences change with increases in the price of tuition. Nevertheless, for future research in this area including fee paying studies would be preferable.

A key difference between this study and previous student choice research was that students who were targeted were part of a census. Traditionally, probability samples are the preferred method of modelling consumer preference as they allow researchers the opportunity to develop an unbiased approach to recruiting members of the total population. However, more recent contributions in the

course level research have used non-probability samples. Maringe (2006) argues this because it is extremely difficult to know exactly how many school leaver age students are interested in applying to university. As a result, he developed a convenience based sample in order to estimate course level preferences. This was the main reason for developing a census. Although the statistical properties of the sample cannot be measured a census overcomes the threat of bias.

iii. Distributing the questionnaire

The paper questionnaire was given to Year 12 and 13 students interested in attending university at two North-East based secondary schools. The paper booklet was distributed during a sixth form assembly with students given the opportunity to complete the survey at the end of assembly or in their tutorial groups. Although an initial introduction was made in front of the entire sixth form that explained the purpose of the study and layout of the questionnaire there was little opportunity to provide students with personal attention due to the size of the assembly. In the case of future research, distributing questionnaires will be limited to individual tutorial groups with sixth form teaching assistance on hand to answer any questions.

iiii. Statistical analysis

As previously mentioned, 218 respondents completed Section **One** of the survey and the number of respondents providing responses for Section **Two** was 213. Ensuring the data was uploaded accurately and 'clean', however, was not straight forward. Due to modelling students' preferences over two designs and including data from two secondary schools, over 23,000 rows were required to be cleaned. The main reason for the large number of rows was that for the multinomial design (as discussed in Section 4.3), each respondent required 96 rows of data, meaning for the multinomial design alone over 22 thousand rows were required.

In total, this took four weeks to clean the data. Post doctorial, a team of researchers would reduce the time required to perform this operation.

If this exercise was repeated it would be preferable to spend more time on planning and administering the questionnaires. To have more time piloting the data would have possibly allowed the spelling errors to be resolved and provided time to upload and run the data. The main reason for running the data before administering the questionnaire is that it would have allowed the coding issues to be identified and better prepared the data (as discussed in Section 4.3). Furthermore, more time would have allowed fee paying students to be included in the survey. One major benefit of including both non-fee paying and fee paying students is that similarities and differences between the two sets of students could be explored. In addition, targeting fee paying students would also provide the opportunity to provide a greater number of observations (as detailed in Section 6.3.1).

Finally, despite demographic data being collected and descriptive analysis being undertaken (as shown in Section 6.3.1) the decision not to analyse the data alongside the respondents' personal information prevented a deeper understanding of how different demographic factors impacted upon respondents' choice of course. The decision not to analyse the demographic data was taken because of time restrictions (Lusk and Hudson, 2004). Analysing the data alongside demographic information is very time consuming as it requires the models' goodness-of-fit to be re-calculated every time a respondent characteristic (such as gender) is calculated. This would have resulted in over 64 individual goodness-of-fit tests to be taken for both the conditional logit and logit models. Nevertheless, this prevented additional results to be uncovered. In the case of future research, detailed demographic information will only be collected if the data is going to be analysed alongside the respondent personal information.

8.5 Areas for future research

There are a number of areas for future research that have arisen after presenting this thesis.

Researching the attribute and levels for this study indicated that very little is known about the initial process of designing a DCE. A preliminary check list has been developed (as illustrated in Table 7.1). Nevertheless future research in marketing would use this preliminary list to investigate the process of collecting attributes and levels and put forward new techniques to ensure the attributes and levels incorporated within a DCE follow a more standard procedure. This improved approach could add greater rigour to the process to ensure that if qualitative data is collected, it is analysed using the most appropriate and recognised techniques.

The monetary values estimated for this study were ascribed to the attributes that influence course level choices. Future research could investigate the impact of estimating student reservation price estimates for university and country level decision making.

Targeting fee paying students would allow cross comparisons to be developed. Although a larger portion of prospective students attend state schools, future research could investigate both sets of students' preferences towards choosing degree courses. A clearer insight into the attributes that affect both groups of students would allow English universities the better to attract and retain a broader range of prospective students. Finally, research incorporating respondents' demographics information would also provide clearer trends in student decision making behaviour.

The length of undergraduate courses was an area that received interesting results. Findings revealed respondents to associate negative preferences towards 3 year and 4 year long programmes that include a placement; thus

meaning respondents only to ascribe preference to 4 year and 5 year long theory based courses. Future research could investigate the format of 4 year long courses, drawing upon Briggs (2006) research into the Scottish HE sector. This would provide further insight if a transition were to be made and English universities began to offer 4 year long degrees.

Theoretical validity was used to investigate the direction of the coefficients as there are relatively few examples of testing external validity. Future research could draw upon new contributions in health economics in order to test for external validity. This would provide insight into how findings from DCEs could be generalised allowing greater use of DCE research at policy level.

8.6 Lessons for new researchers interested in DCEs

As Crotty (1998) describes the importance of physical experience in order to unlock true knowledge it is important to reflect on the *personal experiences* taken from developing this project and how those experiences can be put forward to help new DCE researchers.

The first lesson is that whilst the correct term to be used is 'discrete choice experiments' (Louviere and Flynn, 2010) other terms such as; '*choice modelling (Holdsworth and Nind, 2005), conjoint analysis (Rao, 2009) , choice-based conjoint analysis (Louviere and Woodworth, 1983), discrete choice modelling (Breidert, 2006), stated preference discrete choice modelling (Bateman et al. 2002), choice experiments (Ryan et al. 2008b) and 'pairwise choices and control experiments'* (Ryan and Gerard, 2003) are all found to exist within the critical literature. These terms are often used interchangeably (and more often incorrectly) for the correct term discrete choice experiments. One explanation for the inconsistency in the terminology is that despite being developed within the marketing literature more recent contributions to DCEs have developed in areas such as economics. Thus, suggesting different disciplines have adopted their

own terminology. However, the major criticism with this is that underlying principles of DCE can be forgotten; namely, the importance of behavioural theory. This thesis can recommend that new DCE researchers begin by familiarising themselves with early work by Green and Wind (1975) and Green and Srinivasan (1978) in the area of conjoint analysis, thus, providing an initial understanding for the importance of experimental design theory. Once researchers understand these principles the theoretical shift to DCEs (Louviere and Woodworth, 1983) will make sense. Only by understanding the differences between conjoint analysis and DCEs could the study developed.

On a more methodological note, the importance of developing the attributes and levels for a study cannot be underestimated. Yet surprisingly, the extant literature provides very little guidance on how to approach this task. Therefore, a great deal of time has to be invested in appreciating the need to plan how the data is going to be collected, stored and analysed. Despite rejecting the interpretivist approach to research, an empathy for approaching qualitative research can allow for a more solid DCE design. Although a detailed review of qualitative research principles is not found here, further information is found in Cassell and Symon (2004).

The third and final lesson acknowledges the importance of developing an accurate design that fits the attributes and levels identified from the qualitative data. Design issues include choosing an orthogonal array (as described in Section 4.2.2), collapsing the design (as shown in Appendix G), checking level balance (as illustrated in Appendix H and L) ensuring minimum overlap and understanding the difference between the various probability models (as discussed in Section 4.2.5.1) in preparation for statistical analysis. More commonly either a multinomial or binary design can be developed (as discussed in Section 4.2.2). This thesis has shown that in the process of researching student choice, both designs can help explain course level decision making

through using conditional logit (as discussed in Section 4.2.5.2) and logit models (as discussed in Section 4.2.5.4). The empirical work in this thesis has hopefully provided a good starting point to understanding the basic principles of DCEs, along with the scope to develop a broad range of different DCE designs.

Finally, a wide variety of dedicated software packages is available to analyse the data. Popular packages included Stata, Latent gold and Statistical Analysis System (SAS). This thesis has shown that using a software package that is familiar with other DCE researchers has been of great assistance when analysing the data. Initial attempts using SAS were difficult and slow to process. Yet Stata allowed for quick and accurate results to be generated that could be validated by other DCE researchers.

8.7 A personal challenge

At this point, it is important to reflect as a researcher on the journey since beginning this PhD. The decision to begin this work (as discussed in Section 1. 2) came about through firsthand experience of working in Northumbria University's central Marketing Department. In 2005 it became clear that there was an increasing need to understand the attributes that influence student choice and the monetary values attached to them. As previously described in Section 1.1 this research proposal also stimulated interested from the then Deputy Vice Chancellor for 'Staff and Student Affairs' Prof Peter Slee who also acknowledged the need to understand more clearly how students construct course level choices. However, before beginning the PhD the researcher had never undertaken a large scale research project. Although much time was spent reading about undertaking PhD research, (Philips and Pugh, 2000 and Wellington 2005) during initial stages the researcher struggled to develop the written skills required to write this thesis. Despite the cause of this problem being known, a great deal of time and energy was invested in improving the researcher's written skills. The researcher has benefited from an extremely supportive supervision team. This allowed time to

undertake additional training and to improve the researcher's understanding of multivariate statistics. In 2007 the researcher only had a basic knowledge of regression analysis. Firsthand experience of using statistics was only learnt as part of an undergraduate degree and had never been developed. Nevertheless, the researcher recognises that he now has a strong knowledge of statistics and has enjoyed furthering his understanding of the field. The researcher recognises the support he has received, but on the whole reflects positively on his PhD experience and the skills he has gained.

8.8 Concluding comments

The aim of this thesis has been to investigate how can discrete choice experiments provide an alternative approach within consumer behaviour theory to estimating course level decision making in English Higher Education? The above chapter has brought a conclusion to this study. Through reviewing the research objectives this has provided a greater understanding of how the researchable question was achieved, allowing a number of practical recommendations to be developed. This led to outlining the different areas that this study has contributed to the extant research. Nevertheless, the limitations associated with this research were discussed before highlighting areas for future research. In order to guide new researchers a number of lessons were discussed. The chapter closed by reflecting on the personal journey of undertaking this PhD.

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Appendices

Appendix A: A review of the studies in marketing over the last decade that acknowledge support for Lancaster's (1966) theory of choice

Column 1	Column 2	Column 3	Column 4	Column 5
Study No	**Author**	**Date**	**Title**	**Journal**
1	Wang, P. Z; Menictas, C and Louviere, J. J	2007	Structural Equation Models With Discrete Choice Experiments For Modelling Brand Equity	Australasian Marketing Journal
2	Bernstein, J and Macias, D	2002	Engineering New-Product Success	Industrial Marketing Management
3	Mattsson, J and Helmersson, H	2007	Eating Fast Food: Attitudes Of High-School Students	International Journal of Consumer Studies
4	Street, D. J; Burgess, L and Louviere, J. J	2005	Quick And Easy Choice Sets: Constructing Optimal And Nearly Optimal Stated Choice Experiments	International Journal Of Research In Marketing
5	Islam, T; Louviere, J. J and Burke, P. F	2007	Modelling The Effects Of Including/Excluding Attributes In Choice Experiments On Systematic And Random Components	International Journal Of Research In Marketing
6	Eggers, F and Sattler, H	2009	Hybrid Individualized Two-level Choice Based Conjoint (HIT-CBC): A new Method For Measuring Preference Structures With Many Attribute Levels	International Journal Of Research In Marketing
7	Ryan, M; Gerard, R and Amaya-Amaya, M.	2008	Using Discrete Choice Experiments To Value Health and Health Care	International Review On Public And Nonprofit Marketing

8	Louviere, J. J; Islam, T; Wasi, N; Street, D and Burgess, L.	2008	Designing Discrete Choice Experiments: Do Optimal Designs Come At A Price	Journal Of Consumer Research
9	Swait, J and Adamowicz, W	2001	The Influence Of Task Complexity On Consumer Choice: A Latent Class Model Of Decision Strategy Switching	Journal Of Consumer Research
10	Louviere, J. J	2001	What If Consumer Experiments Impact Variances As Well As Means? Response Variability As A Behavioural Phenomenon	Journal Of Consumer Research
11	Aaker, J; Drolet, A; Griffin, D and Liu, W	2008	Untitled (Forthcoming)	Journal Of Consumer Research
12	Kanninen, B. J	2002	Optimal Design For Multinomial Choice Experiments	Journal of Marketing Research
13	Sandor, Z and Wedel, M	2001	Designing Conjoint Choice Experiments Using Managers' Prior Beliefs	Journal of Marketing Research
14	Kessels, R; Goos, P and Vandebroek, M	2006	A Comparison Of Criteria To Design Efficient Choice Experiments	Journal of Marketing Research
15	Sandor, Z and Wedel, M	2005	Heterogeneous Conjoint Choice Designs	Journal of Marketing Research
16	Wang, P; Gudergan, S and	2008	The Role Of Product	Journal Of Electronic

	Lings, I		Involvement In E-Service Evaluations	Marketing And Retailing
17	Seock, Y. K	2009	Influence Of Retail Store Environmental Cues On Consumer Patronage Behaviour Across Different Retail Store formats: An empirical analysis of US Hispanic consumers	Journal Of Retailing And Consumer Services
18	Gillbride, T. J; Guiltinan, J. P and Urbany, J. E	2008	Framing Effects In Mixed Price Bundling	Marketing Letters
19	O'Mahony, B; Hall, J; Lockshin, L; Jago, L and Brown, G.	2006	Understanding The Impact Of Wine Tourism On Post-Tour Purchasing Behaviour	Marketing Management
20	Lawson, S and Glowa, T	2000	Discrete Choice Experiments And Traditional Conjoint Analysis	Quirk's Marketing Research Review
21	Fiebig, D. G; Keane, M. P; Louviere, J. J and Wasi, N	2009	The Generalized Multinomial Logit Model: Accounting For Scale And Coefficient Heterogeneity	Marketing Science
22	Carter, R. E and Curry, D. J	2010	Transparent pricing: theory, tests, and implications for marketing practice	Journal of the Academy of Marketing Science

Appendix B: A table showing the use of discrete choice experiments outside of the marketing literature

Column 1	Column 2	Column 3	Column 4	Column 5
Number (1)	**Reference (2)**	**Discipline (3)**	**Approach used to estimate willingness to pay (4)**	**The probability model used to analyse the data (5)**
1	(Kjaer, Bech, Gyrd-Hansen and Hart-Hansen, 2006)	Health economics	Discrete choice experiment	Logit
2	(Ryan and Watson, 2009)	Health economics	Discrete choice experiment	Logit
3	(Hall, Fiebig, King, Hossain and Louviere, 2007)	Health economics	Discrete choice experiment	Conditional logit
4	(Howard and Salkeld, 2009)	Health economics	Discrete choice experiment	Mixed logit
5	(Hjelmgren and Anell, 2007)	Health economics	Discrete choice experiment	Conditional logit
6	(King, Hall, Lancsar, Fiebig, Hossain, Louviere, Reddel and Jenkins, 2006)	Health economics	Discrete choice experiment	Conditional logit
7	(Gunther and Konig, 2006)	Health economics	Discrete choice experiment	Conditional logit
8	(Wordsworth, Ryan, Skatun and Waugh, 2006)	Health economics	Discrete choice experiment	A review of the secondary data on DCE
9	(Ozdemir, Johnson and Hauber, 2009)	Health economics	Discrete choice experiment	Nested logit
10	(Watson and Ryan, 2007)	Health economics	Discrete choice experiment	Conditional logit
11	(Arana, Leon and Hanemann, 2008)	Health economics	Discrete choice experiment	Conditional logit
12	(Grutters, Kessels, Dirksen, Helvoort-Postulart, Anteunis and Joore, 2008)	Health economics	Discrete choice experiment	Logit
13	(Negrin, Pinilla and Leon, 2008)	Health economics	Discrete choice experiment	Mixed logit

14	(Marshall, Johnson, Kulin, Ozdemir, Walsh, Marshall, Bebber and Phillips, 2009)	Health economics	Discrete choice experiment	Conditional logit
15	(Brau and Lippi Bruni, 2008)	Health economics	Discrete choice experiment	Nested logit
16	(Chuck, Adamowicz, Jacobs, Ohinmaa, Dick and Rashiq, 2009)	Health economics	Discrete choice experiment	Conditional logit
17	(Watson, Ryan and Watson, 2009)	Health economics	Discrete choice experiment	Logit
18	(Mataria, Giacaman, Khatib and Moatti, 2006)	Health economics	Discrete choice experiment	Logit
19	(Petrou and McIntosh, 2009)	Health economics	Discrete choice experiment	Probit
20	(Kruk, Paczkowski, Mbaruku, Pinho, de-pinko and Galea, 2009)	Health economics	Discrete choice experiment	Conditional logit
21	(Martin-Fernandez, Gomez-Gascon, Oliva-Moreno, del Cura-Gonzalez, Dominguez-Bidagor, Beamud-Lagos and Sanz-Cuesta, 2010)	Health economics	Discrete choice experiment	Conditional logit
22	(Quevedo, Hernandez, Espinosa and Escudero, 2009)	Health economics	Discrete choice experiment	Conditional logit
23	(Ryan, Netten, Skatun and Smith, 2006)	Health economics	Discrete choice experiment	Conditional logit
24	(Ryan, Watson and Gerard, 2008b)	Health economics	Discrete choice experiment	Conditional logit
25	(Ryan, Skatun and Major, 2008)	Health economics	Discrete choice experiment	Conditional logit

26	(Gerard, Shanahan and Louviere, 2008)	Health economics	Discrete choice experiment	Logit
27	(Bryan and Roberts, 2008)	Health economics	Discrete choice experiment	Logit
28	(Scott, Uback, French and Needham, 2008)	Health economics	Discrete choice experiment	Logit
29	(Gyrd-Hansen, Slothuus Skjoldborg, 2008)	Health economics	Discrete choice experiment	Conditional logit
30	(Mark and Swait, 2008)	Health economics	Discrete choice experiment	Conditional logit
31	(Hensher, 2006)	Environmental economics	Discrete choice experiment	Conditional logit
32	(Campbell, Hutchinson and Scarpa, 2008)	Environmental economics	Discrete choice experiment	Conditional logit
33	(Birol, Smale and Gyovai, 2006)	Environmental economics	Discrete choice experiment	Conditional logit
34	(Itaoka, Saito, Krupnick, Adamowicz and Taniguchi, 2006)	Environmental economics	Discrete choice experiment	Conditional logit
35	(Ladenburg and Olsen, 2008)	Environmental economics	Discrete choice experiment	Conditional logit
36	(Carlsson and Martinsson, 2008)	Environmental economics	Discrete choice experiment	Logit
37	(Johnston, 2007)	Environmental economics	Discrete choice experiment	Conditional logit
38	(Collins and Vossler, 2009)	Environmental economics	Discrete choice experiment	Conditional logit
39	(Carlsson, Frykblom and Lagerkvist, 2007)	Environmental economics	Discrete choice experiment	Conditional logit
40	(Morkbak, Christensen and Gyrd-Hansen, 2010)	Environmental economics	Discrete choice experiment	Conditional logit
41	(Beharry-Borg, Hensher and Scarpa, 2009)	Environmental economics	Discrete choice experiment	Conditional logit

42	(Bosworth, Ann Cameron and DeShazo, 2009)	Environmental economics	Discrete choice experiment	Logit
43	(Bush, Colombo and Hanley, 2009)	Environmental economics	Discrete choice experiment	Logit
44	(Birol, Das and Bhattacharaya, 2009)	Environmental economics	Discrete choice experiment	Conditional logit
45	(Timmins and Murdock, 2005)	Environmental economics	Discrete choice experiment	Logit
46	(Czajkowski and Hanley, 2009)	Environmental economics	Discrete choice experiment and Contingent valuation	Conditional logit
47	(DeShazo, Ann Cameron and Saenz, 2009)	Environmental economics	Discrete choice experiment	Conditional logit
48	(Rizzi and DeDios Ortuzar, 2006)	Transportation	Discrete choice experiment	Conditional logit
49	(Scarpa and Willis, 2006)	Transportation	Discrete choice experiment	Conditional logit
50	(Rose, Hensher, Caussade, de Dios Ortuzar and Jou, 2009)	Transportation	Discrete choice experiment	Conditional logit
51	(Potoglou and Kanaroglou, 2006)	Transportation	Discrete choice experiment	Nested logit
52	(Eboli and Mazzulla, 2008)	Transportation	Discrete choice experiment	Conditional logit
53	(McDonnell, Ferreira and Convery, 2009)	Transportation	Discrete choice experiment	Conditional logit
54	(Roman, Espino and Carlos Martin, 2007)	Transportation	Discrete choice experiment	Conditional logit
55	(Hensher, 2008)	Transportation	Discrete choice experiment	Logit and conditional logit
56	(Daly, Hess and Train, 2012)	Transportation	Discrete choice experiment	Mixed logit
57	(Espino, Carlos Martin and Roman, 2008)	Transportation	Discrete choice experiment	Conditional logit

Totals from column 5
Logit = 13
Conditional logit = 37
Mixed logit = 7
Review of secondary logit = 1

Appendix C: Detail on the schools based in the Newcastle area

Column 1	Column 2
136	Mixed secondary school
4	All boys
5	All girls
145	**Total**

Column 1	Column 2
126	Non faith
19	Faith including Roman Catholic and Church of England
145	**Total**

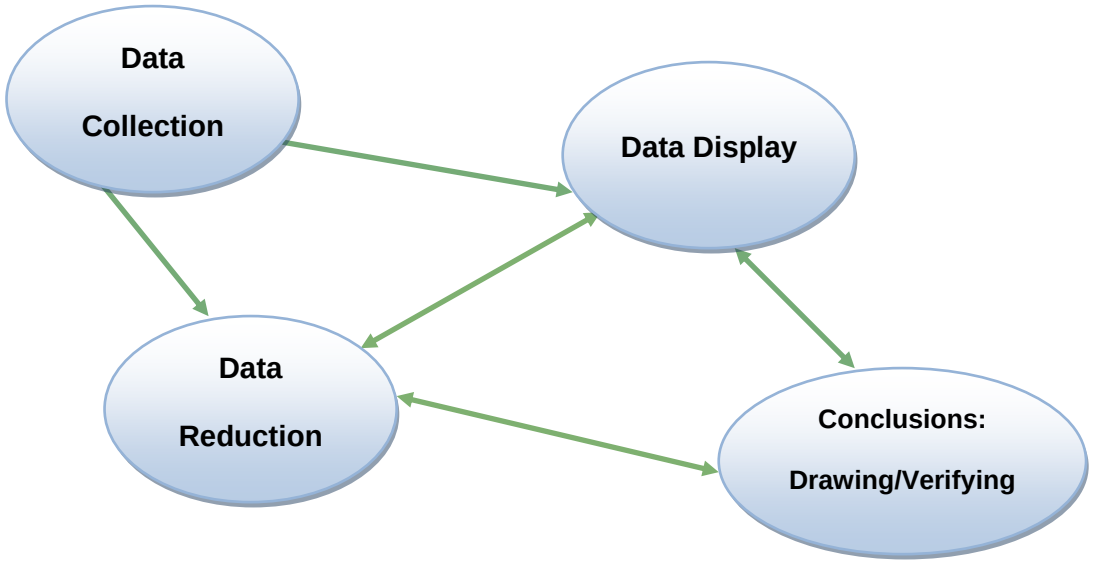
Total population of state school pupils: 175175

Column 1	Column 2
21	Mixed secondary school
2	All boys
11	All girls
34	**Total**

Column 1	Column 2
31	Non faith
3	Faith including Roman Catholic and Church of England
34	**Total**

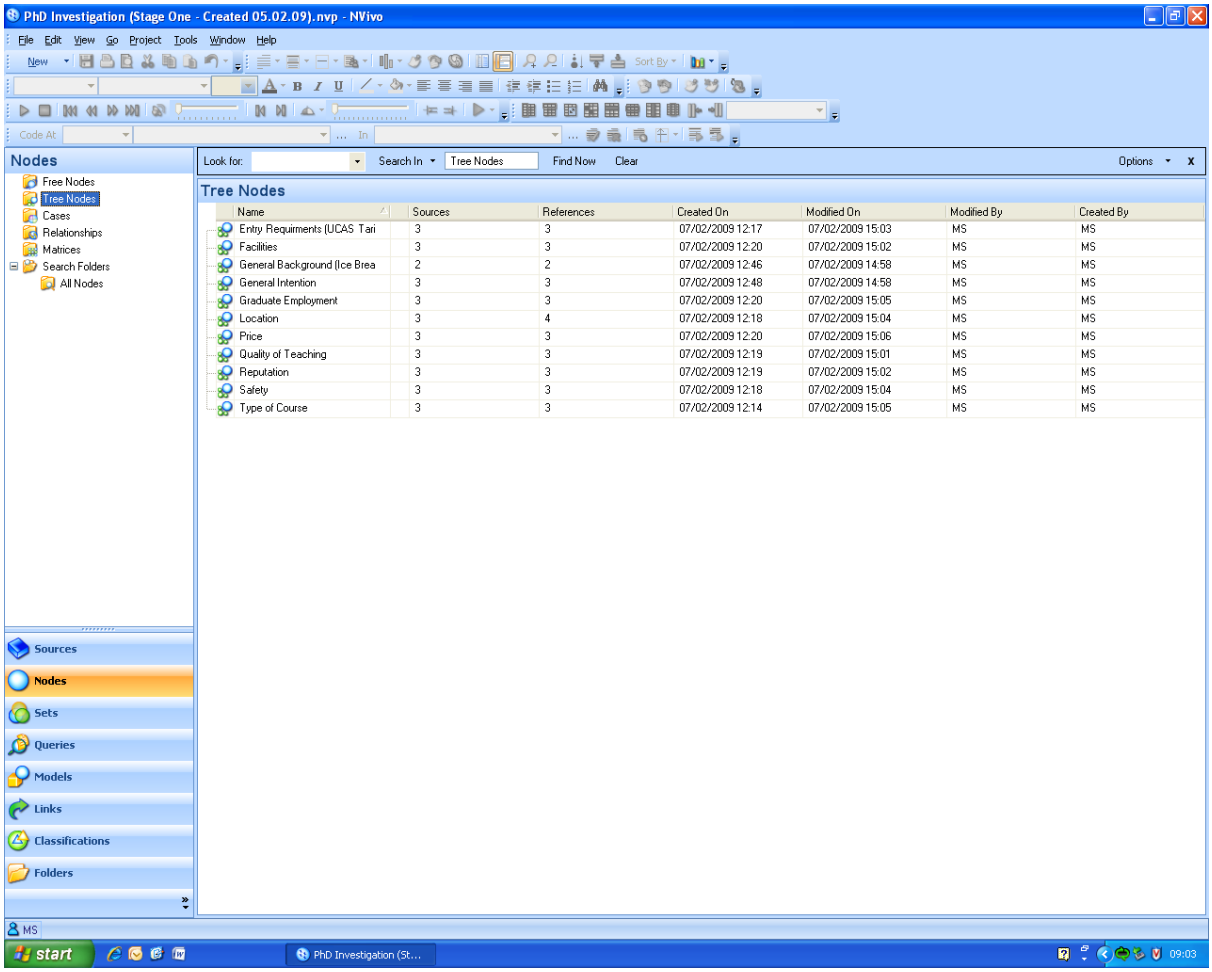
Total population of independent school pupils: 19,991

Appendix D: The model of qualitative analysis (Miles and Huberman, 1994, p. 10)

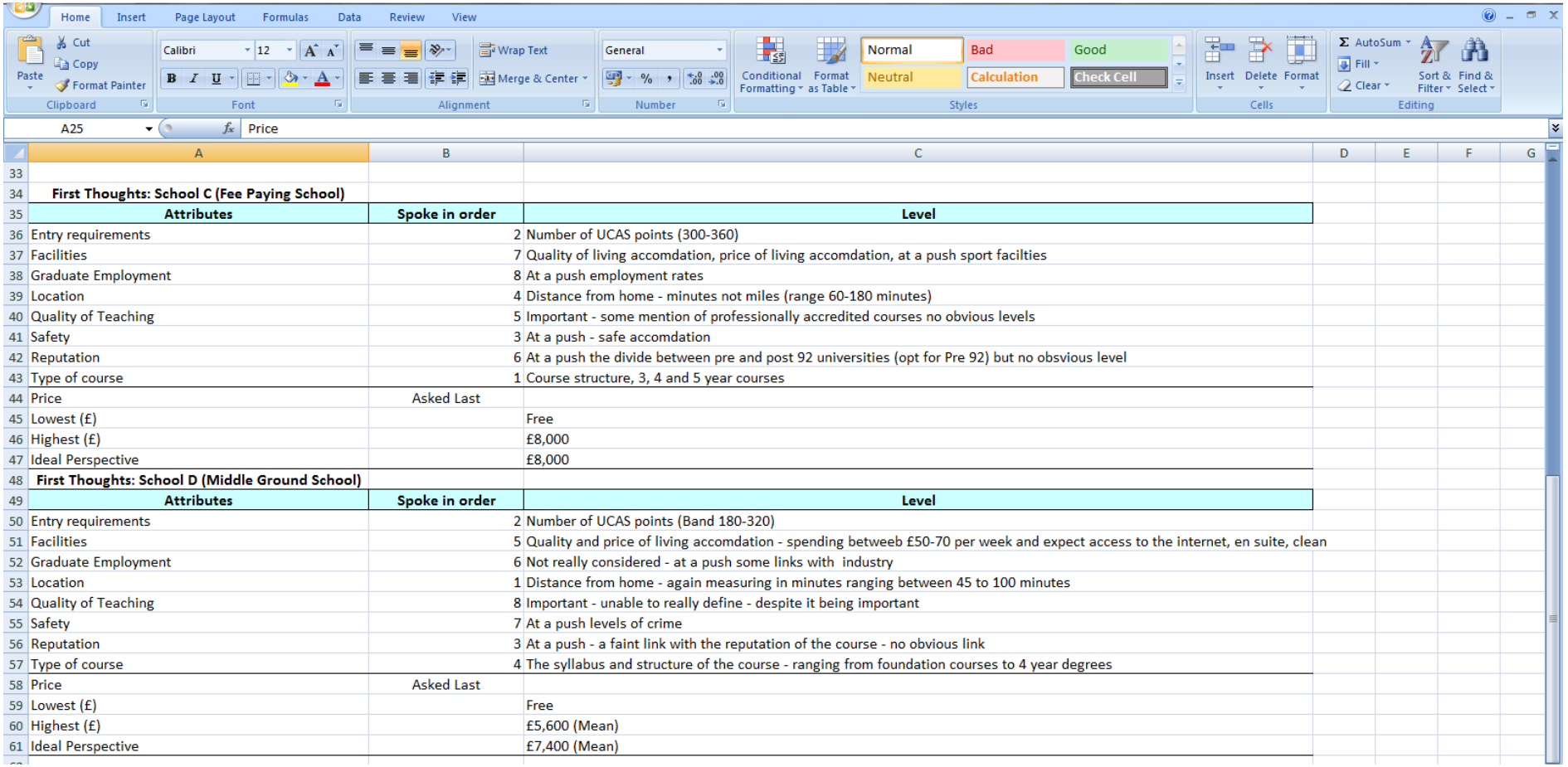


Column 1	Column 2
Stage	**Process**
Stage 1 ~ Date collection	Qualitative data can be collected from interviews such as focus group and face-to-face discussions
Stage 2 ~ Data reduction	This stage involves simplifying the data into different themes under the main interview headings
Stage 3 ~ Data display	Following the reduction of the data, themes can be presented diagrammatically in preparation for drawing conclusions
Stage 4 ~ Conclusions	Conclusions are drawn from the literature using one of a possible twelve different techniques in order to allow themes to be verified and conclusions to be drawn

Appendix E: The data reduction stage of analysis using NVivo



Appendix F: Broad themes taken from analysing the data



	A	B	C
33			
34	**First Thoughts: School C (Fee Paying School)**		
35	**Attributes**	**Spoke in order**	**Level**
36	Entry requirements	2	Number of UCAS points (300-360)
37	Facilities	7	Quality of living accomdation, price of living accomdation, at a push sport facilties
38	Graduate Employment	8	At a push employment rates
39	Location	4	Distance from home - minutes not miles (range 60-180 minutes)
40	Quality of Teaching	5	Important - some mention of professionally accredited courses no obvious levels
41	Safety	3	At a push - safe accomdation
42	Reputation	6	At a push the divide between pre and post 92 universities (opt for Pre 92) but no obsvious level
43	Type of course	1	Course structure, 3, 4 and 5 year courses
44	Price	Asked Last	
45	Lowest (£)		Free
46	Highest (£)		£8,000
47	Ideal Perspective		£8,000
48	**First Thoughts: School D (Middle Ground School)**		
49	**Attributes**	**Spoke in order**	**Level**
50	Entry requirements	2	Number of UCAS points (Band 180-320)
51	Facilities	5	Quality and price of living accomdation - spending betweeb £50-70 per week and expect access to the internet, en suite, clean
52	Graduate Employment	6	Not really considered - at a push some links with industry
53	Location	1	Distance from home - again measuring in minutes ranging between 45 to 100 minutes
54	Quality of Teaching	8	Important - unable to really define - despite it being important
55	Safety	7	At a push levels of crime
56	Reputation	3	At a push - a faint link with the reputation of the course - no obvious link
57	Type of course	4	The syllabus and structure of the course - ranging from foundation courses to 4 year degrees
58	Price	Asked Last	
59	Lowest (£)		Free
60	Highest (£)		£5,600 (Mean)
61	Ideal Perspective		£7,400 (Mean)

Appendix G: The fixed orthogonal main effects plan OA 32.9.4.2 for the multinomial design within Section **One**, (Sloan, 2009)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Profiles	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**	**A_7**	**A_8**	**A_9**
1	**0**	**0**	**3**	**3**	**3**	**3**	1	2	0
2	**0**	**1**	**2**	**0**	**2**	**1**	3	1	3
3	**0**	**2**	**1**	**2**	**0**	**0**	2	3	2
4	**0**	**3**	**0**	**1**	**1**	**2**	0	0	1
5	**1**	**0**	**2**	**2**	**1**	**3**	3	3	1
6	**1**	**1**	**3**	**1**	**0**	**1**	1	0	2
7	**1**	**2**	**0**	**3**	**2**	**0**	0	2	3
8	**1**	**3**	**1**	**0**	**3**	**2**	2	1	0
9	**2**	**0**	**1**	**3**	**0**	**2**	3	0	3
10	**2**	**1**	**0**	**0**	**1**	**0**	1	3	0
11	**2**	**2**	**3**	**2**	**3**	**1**	0	1	1
12	**2**	**3**	**2**	**1**	**2**	**3**	2	2	2
13	**3**	**0**	**0**	**2**	**2**	**2**	1	1	2
14	**3**	**1**	**1**	**1**	**3**	**0**	3	2	1
15	**3**	**2**	**2**	**3**	**1**	**1**	2	0	0
16	**3**	**3**	**3**	**0**	**0**	**3**	0	3	3
17	**0**	**0**	**3**	**1**	**1**	**0**	2	1	3
18	**0**	**1**	**2**	**2**	**0**	**2**	0	2	0
19	**0**	**2**	**1**	**0**	**2**	**3**	1	0	1
20	**0**	**3**	**0**	**3**	**3**	**1**	3	3	2
21	**1**	**0**	**2**	**0**	**3**	**0**	0	0	2
22	**1**	**1**	**3**	**3**	**2**	**2**	2	3	1
23	**1**	**2**	**0**	**1**	**0**	**3**	3	1	0
24	**1**	**3**	**1**	**2**	**1**	**1**	1	2	3
25	**2**	**0**	**1**	**1**	**2**	**1**	0	3	0
26	**2**	**1**	**0**	**2**	**3**	**3**	2	0	3
27	**2**	**2**	**3**	**0**	**1**	**2**	3	2	2
28	**2**	**3**	**2**	**3**	**0**	**0**	1	1	1
29	**3**	**0**	**0**	**0**	**0**	**1**	2	2	1
30	**3**	**1**	**1**	**3**	**1**	**3**	0	1	2
31	**3**	**2**	**2**	**1**	**3**	**2**	1	3	3
32	**3**	**3**	**3**	**2**	**2**	**0**	3	0	0

The profiles, once labels are added to attribute codes, adapted from OA 32.9.4.2 for experiment one positioned within Section **One**, (Sloan, 2009)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Profiles	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**
1	180	Poor	180 mins	36 hours per week	5 year theory	12,500
2	180	Moderate	135 min	9 hours per week	4 years no placement	6,500
3	180	good	90 mins	27 hours per week	3 year theory	3,500
4	180	very good	45 mins	18 hours per week	4 years including one year on industrial placement	9,500
5	240	poor	135 mins	27 hours per week	4 years including one year on industrial placement	12,500
6	240	Moderate	180 mins	18 hours per week	3 year theory	6,500
7	240	good	45 mins	36 hours per week	4 years no placement	3,500
8	240	very good	90 mins	9 hours per week	5 year theory	9,500
9	300	Poor	90 mins	36 hours per week	3 year theory	9,500
10	300	Moderate	45 mins	9 hours per week	4 years including one year on industrial placement	3,500
11	300	good	180 mins	27 hours per week	5 year theory	6,500
12	300	very good	135 mins	18 hours per week	4 years no placement	12,500
13	360	Poor	45 mins	27 hours per week	4 years no placement	9,500
14	360	Moderate	90 mins	18 hours per week	5 year theory	3,500
15	360	good	135 mins	36 hours per week	4 years including one year on industrial placement	6,500
16	360	very good	180 mins	9 hours per week	3 year theory	12,500
17	180	Poor	180 mins	18 hours per week	4 years including one year on	3,500

					industrial placement	
18	180	Moderate	135 mins	27 hours per week	3 year theory	9,500
19	180	good	90 mins	9 hours per week	4 years no placement	12,500
20	180	very good	45 mins	36 hours per week	5 year theory	6,500
21	240	Poor	135 mins	9 hours per week	5 year theory	3,500
22	240	Moderate	180 mins	36 hours per week	4 years no placement	9,500
23	240	good	45 mins	18 hours per week	3 year theory	12,500
24	240	very good	90 mins	27 hours per week	4 years including one year on industrial placement	6,500
25	300	Poor	90 mins	18 hours per week	4 years no placement	6,500
26	300	Moderate	45 mins	27 hours per week	5 year theory	12,500
27	300	good	180 mins	9 hours per week	4 years including one year on industrial placement	9,500
28	300	very good	135 mins	36 hours per week	3 year theory	3,500
29	360	Poor	45 mins	9 hours per week	3 year theory	6,500
30	360	Moderate	90 mins	36 hours per week	4 years including one year on industrial placement	12,500
31	360	good	135 mins	18 hours per week	5 year theory	9,500
32	360	very good	180 mins	27 hours per week	4 years no placement	3,500

Appendix H: Level balance for the multiple choice alternative positioned with Section One

Column 1	Column 2	Column 3
Attributes	**Level**	**No. Of Appearances In Experiment One**
Tariff Points	180	8
	240	8
	300	8
	360	8
Quality of Accommodation	Poor	8
	Moderate	8
	Good	8
	Very Good	8
Time In Minutes	45	8
	90	8
	135	8
	180	8
Time In Hours	9	8
	18	8
	27	8
	36	8
Structure	3	8
	3+1	8
	4	8
	5	8
Cost	3500	8
	6500	8
	9500	8
	12500	8

Appendix I: The L^{MA} method of constructing of choice sets, (Street *at al.* 2005)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14
	Course A							**Course B**					
Pair	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**	**Pair**	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**
1	0	0	3	3	3	3	**1**	1	1	0	0	0	0
2	0	1	2	0	2	1	**2**	1	2	3	1	3	2
3	0	2	1	2	0	0	**3**	1	3	2	3	1	1
4	0	3	0	1	1	2	**4**	1	0	1	2	2	3
5	1	0	2	2	1	3	**5**	2	1	3	3	2	0
6	1	1	3	1	0	1	**6**	2	2	0	2	1	2
7	1	2	0	3	2	0	**7**	2	3	1	0	3	1
8	1	3	1	0	3	2	**8**	2	0	2	1	0	3
9	2	0	1	3	0	2	**9**	3	1	2	0	1	3
10	2	1	0	0	1	0	**10**	3	2	1	1	2	1
11	2	2	3	2	3	1	**11**	3	3	0	3	0	2
12	2	3	2	1	2	3	**12**	3	0	3	2	3	0
13	3	0	0	2	2	2	**13**	0	1	1	3	3	3
14	3	1	1	1	3	0	**14**	0	2	2	2	0	1
15	3	2	2	3	1	1	**15**	0	3	3	0	2	2
16	3	3	3	0	0	3	**16**	0	0	0	1	1	0
17	0	0	3	1	1	0	**17**	1	1	0	2	2	1
18	0	1	2	2	0	2	**18**	1	2	3	3	1	3
19	0	2	1	0	2	3	**19**	1	3	2	1	3	0

20	0	3	0	3	3	1	**20**	1	0	1	0	0	2
21	1	0	2	0	3	0	**21**	2	1	3	1	0	1
22	1	1	3	3	2	2	**22**	2	2	0	0	3	3
23	1	2	0	1	0	3	**23**	2	3	1	2	1	0
24	1	3	1	2	1	1	**24**	2	0	2	3	2	2
25	2	0	1	1	2	1	**25**	3	1	2	2	3	2
26	2	1	0	2	3	3	**26**	3	2	1	3	0	0
27	2	2	3	0	1	2	**27**	3	3	0	1	2	3
28	2	3	2	3	0	0	**28**	3	0	3	0	1	1
29	3	0	0	0	0	1	**29**	0	1	1	1	1	2
30	3	1	1	3	1	3	**30**	0	2	2	0	2	0
31	3	2	2	1	3	2	**31**	0	3	3	2	0	3
32	3	3	3	2	2	0	**32**	0	0	0	3	3	1

Appendix J: The final set of choice sets as used in Section **One**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Profile	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**A_6**
Choice 1 B	240	Moderate	45 mins	9 hours per week	3 year theory	3,500
Choice 2 B	240	Good	180 Mins	18 Hours per week	5 year theory based	9,500
Choice 3 B	240	Very Good	135 mins	36 hours per week	4 years including one year on placement	6,500
Choice 4 B	240	Poor	90 mins	27 hours per week	4 years no placement	12,500
Choice 5 B	300	Moderate	180 Mins	36 hours per week	4 years no placement	3,500
Choice 6 B	300	Good	45 mins	27 hours per week	4 years including one year on placement	9,500
Choice 7 B	300	Very Good	90 mins	9 hours per week	5 year theory based	6,500
Choice 8 B	300	Poor	135 mins	18 Hours per week	3 year theory	12,500
Choice 9 B	360	Moderate	135 mins	9 hours per week	4 years including one year on placement	12,500
Choice 10 B	360	Good	90 mins	18 Hours per week	4 years no placement	6,500
Choice 11 B	360	Very Good	45 mins	36 hours per week	3 year theory	9,500
Choice 12 B	360	Poor	180 Mins	27 hours per week	5 year theory based	3,500
Choice 13 B	180	Moderate	90 mins	36 hours per week	5 year theory based	12,500
Choice 14 B	180	Good	135 mins	27 hours per week	3 year theory	6,500
Choice 15 B	180	Very Good	180 Mins	9 hours per week	4 years no placement	9,500
Choice 16 B	180	Poor	45 mins	18 Hours per week	4 years including one year on placement	3,500
Choice 17 B	240	Moderate	45 mins	27 hours per week	4 years no placement	6,500
Choice 18 B	240	Good	180 Mins	36 hours per week	4 years including one year on placement	12,500
Choice 19 B	240	Very Good	135 mins	18 Hours per week	5 year theory based	3,500
Choice 20 B	240	Poor	90 mins	9 hours per week	3 year theory	9,500

Choice 21 B	300	Moderate	180 Mins	18 Hours per week	3 year theory	6,500
Choice 22 B	300	Good	45 mins	9 hours per week	5 year theory based	12,500
Choice 23 B	300	Very Good	90 mins	27 hours per week	4 years including one year on placement	3,500
Choice 24 B	300	Poor	135 mins	36 hours per week	4 years no placement	9,500
Choice 25 B	360	Moderate	135 mins	27 hours per week	5 year theory based	9,500
Choice 26 B	360	Good	90 mins	36 hours per week	3 year theory	3,500
Choice 27 B	360	Very Good	45 mins	18 Hours per week	4 years no placement	12,500
Choice 28 B	360	Poor	180 Mins	9 hours per week	4 years including one year on placement	6,500
Choice 29 B	180	Moderate	90 mins	18 Hours per week	4 years including one year on placement	9,500
Choice 30 B	180	Good	135 mins	9 hours per week	4 years no placement	3,500
Choice 31 B	180	Very Good	180 Mins	27 hours per week	3 year theory	12,500
Choice 32 B	180	Poor	45 mins	36 hours per week	5 year theory based	6,500

Appendix K: The mixed orthogonal main effects plan OA 8.2.4.4.1 for the binary experiment, (Sloan, 2009)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Choice sets	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
1	0	0	0	0	0
2	1	1	1	1	0
3	0	0	1	1	1
4	1	1	0	0	1
5	0	1	0	1	2
6	1	0	1	0	2
7	0	1	1	0	3
8	1	0	0	1	3

The converted values taken from stage one of the data collection process

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Choice sets	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
1a	No	No	No	No	50
2a	Yes	Yes	Yes	Yes	50
3a	No	No	Yes	Yes	75
4a	Yes	Yes	No	No	75
5a	No	Yes	No	Yes	100
6a	Yes	No	Yes	No	100
7a	No	Yes	Yes	No	125
8a	Yes	No	No	Yes	125

Appendix L: Level balance for the binary experiment positioned with Section **Two**

Column 1	Column 2	Column 3
Attributes	**Level**	**No. Of Appearances In Experiment**
Location	No	4
	Yes	4
Internet	No	4
	Yes	4
En suite	No	4
	Yes	4
Cleanliness	No	4
	Yes	4
Cost	50	2
	75	2
	100	2
	125	2

Appendix M: The L^{MA} method of constructing choice sets, (Burgess *et al.* 2005)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
Choice sets	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**Shift**	**Choice sets**	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
1	0	0	0	0	0		**1b**	1	1	1	1	1
2	1	1	1	1	0		**2b**	2	2	2	2	1
3	0	0	1	1	1		**3b**	1	1	2	2	2
4	1	1	0	0	1		**4b**	2	2	1	1	2
5	0	1	0	1	2		**5b**	1	2	1	2	3
6	1	0	1	0	2		**6b**	2	1	2	1	3
7	0	1	1	0	3		**7b**	1	2	2	1	0
8	1	0	0	1	3		**8b**	2	1	1	2	0

The final set of choice sets as used in Section **Two**

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13
Choice sets	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**	**Once Randomised**	**Choice sets**	**A_1**	**A_2**	**A_3**	**A_4**	**A_5**
1	Yes	Yes	Yes	Yes	75		**1**	No	Yes	No	Yes	125
2	No	No	No	No	75		**2**	No	No	No	No	75
3	Yes	Yes	No	No	100		**3**	No	No	Yes	Yes	100
4	No	No	Yes	Yes	100		**4**	No	Yes	Yes	No	50
5	Yes	No	Yes	No	125		**5**	Yes	Yes	Yes	Yes	75
6	No	Yes	No	Yes	125		**6**	Yes	No	No	Yes	50
7	Yes	No	No	Yes	50		**7**	Yes	Yes	No	No	100
8	No	Yes	Yes	No	50		**8**	Yes	No	Yes	No	125

Appendix N: The survey instrument

What Determines A Student's Choice Of Full-Time Undergraduate Degree Programme?: A Questionnaire To Examine Student Choice

The purpose of the study is to understand the core determinants of choosing a full-time undergraduate degree programme. This study is part of a postgraduate Doctoral research investigation within Newcastle Business School (NBS). None of the answers you provide will be considered right or wrong. Respondents' comments will not be disclosed other than anonymously.

Please remember this is a purely hypothetical exercise and will have <u>no</u> impact on your actual choice of degree course.
The questionnaire will take approximately 10-15 minutes to complete.

Instructions

This study is made up of **Section One** that contains 32 choice scenarios before **Section Two** asks you to consider 8 choices scenarios in relation to first year university accommodation. Finally **Section Three** asks you to provide some personal information.

Table One identifies the difference between the quality of rented university accommodation

Table One:

Quality of Accommodation	Definition
Poor	Noisy, the facilities are in need of repair; there are shared bathroom and toilet facilities; a lack of cleanliness, a poor level of building security; positioned far away from the university campus; no internet access
Moderate	Fairly noisy; the facilities are in need of a some repair; shared bathroom and toilet facilities; a fair level of cleanliness; evidence of security; positioned fairly close to the university campus; limited internet access
Good	Fairly quiet; fully functioning facilities; access to ensuite facilities; a good level of cleanliness; good level of security; close to the university campus; unlimited internet access
Very Good	Very quiet; fully functioning facilities; access to ensuite facilities; extremely high level of cleanliness; very good level of security; very close to the university campus; unlimited internet access

Section One

In Section One the individual scenarios ask you to consider two different degree courses; **Course A or Course B**. You will be asked to indicate which course you prefer by considering the criteria that make up each course. If you feel that you would not choose either Course **A** or Course **B** then feel free to tick **Neither**. Finally please make sure you only tick **one** box.

For Example:

Imagine a situation in which you are preparing an application to select a full-time undergraduate degree course at an English university. After some time thinking about what subject you would like to study you have narrowed your choice down to two options: **Course A** and **Course B**. Each of the degree courses contains different decision making factors and a predetermined set of values. Please consider the following scenarios and select which course you would prefer to choose.

Example Question	**Course A**	**Course B**
The number of entry requirements	240 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Very Good	Poor
The distance from your family home	60 minutes	135 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	4 years including 1 year on industrial placement	3 year theory based
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☑ **Neither** ☐

(tick **one** box only)

Please turn overleaf to start Section One

Question 1	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 2	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 3	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	4 years with no placement	5 years theory based
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 4	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	3 year theory based	4 years including one year on industrial placement
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 5	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 6	Course **A**	Course **B**
Number of points needed	360 Moderate	180 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 7	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 8	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 9	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 10	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 11	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 12	**Course A**	**Course B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	5 years theory based	3 year theory based
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 13	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 14	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 15	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 16	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 17	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 18	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 19	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 20	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 21	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 22	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 23	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	4 years including one year on industrial placement	4 year no placement
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 24	Course **A**	Course **B**
Number of points needed	180 UCAS points	240 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 25	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	4 years including one year on industrial placement	4 years no placement
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 26	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	180 minutes	45 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 27	Course **A**	Course **B**
Number of points needed	240 UCAS points	300 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	9 hours per week	18 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 28	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	4 years no placement	5 year theory based
Cost per year	£6,500	£9,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 29	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Poor	Moderate
The distance from your family home	90 minutes	135 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	3 year theory based	4 years including one year on placement
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 30	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Moderate	Good
The distance from your family home	45 minutes	90 minutes
The amount of contact time per week	27 hours per week	36 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£12,500	£3,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 31	Course **A**	Course **B**
Number of points needed	360 UCAS points	180 UCAS points
The quality of rented accommodation as shown in table one	Good	Very good
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	18 hours per week	27 hours per week
The course structure	5 year theory based	3 year theory based
Cost per year	£9,500	£12,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Question 32	Course **A**	Course **B**
Number of points needed	300 UCAS points	360 UCAS points
The quality of rented accommodation as shown in table one	Very good	Poor
The distance from your family home	135 minutes	180 minutes
The amount of contact time per week	36 hours per week	9 hours per week
The course structure	3 year theory based	4 years including one year on industrial placement
Cost per year	£3,500	£6,500

Which course do you prefer? **Course A** ☐ **Course B** ☐ **Neither** ☐

(tick **one** box only)

Please turn overleaf to continue with Section Two

Section Two

This section asks you to consider the 8 choices listed below ticking your preferred option for each scenario. The choices relate to first year university rented accommodation.

Accommodation scenarios	Located close to the university campus	Internet access	Ensuite facility	Is clean	The cost charged to you per week for accommodation	I would rent this accommodation	I would not rent this accommodation
Choice 1	No	Yes	No	Yes	£125		
Choice 2	No	No	No	No	£75		
Choice 3	No	No	Yes	Yes	£100		
Choice 4	No	Yes	Yes	No	£50		
Choice 5	Yes	Yes	Yes	Yes	£75		
Choice 6	Yes	No	No	Yes	£50		
Choice 7	Yes	Yes	No	No	£100		
Choice 8	Yes	No	Yes	No	£125		

Please turn overleaf to continue with Section Three

Section Three – Personal Information

Q1. Please specify your gender

Male..... ☐

Female..... ☐

Q2. What is your age?

16..... ☐

17..... ☐

18..... ☐

19..... ☐

Q3. What year are you currently in at school?

Year 12 (Lower Sixth)..... ☐

Year 13 (Upper Sixth)..... ☐

Q4. Do you have any older brother or sisters who have attended university?

No..... ☐

Yes..... ☐

(If yes please specify below e.g. 1 sister)

Q5. Please try and estimate your parents/guardians combined household income per year

Less than £10,000..... ☐

£10,000 to £19,999..... ☐

£20,000 to £29,999..... ☐

£30,000 to 39,999..... ☐

£40,000 to £49,999..... ☐

£50,000 to 59,999..... ☐

£60,000 to £69,999..... ☐

£70,000 to £79,999..... ☐

£80,000 to £89,000..... ☐

£90,000 to £99,999..... ☐

More Than £100,000..... ☐

Q6. Please tick your parents/guardians level of occupation

Professional..... ☐

Manual skilled..... ☐

Manual unskilled..... ☐

Q7. What degree courses are you interested in applying for at university? Please specify in order of preference

Q8. What type of university are you applying for?

Pre 1992 (Old university)

..... ☐

Post 1922 (Modern university)

..... ☐

Q9. When did you first realise you wanted to attend university?

B*efore year 9*..... ☐

Year 9..... ☐

Year 10..... ☐

Year 11..... ☐

Year 12..... ☐

Year 13..... ☐

Q10. What grades did you achieve at GCSE? *(E.g. 1x A, 4x B, 6x C)*

Appendix O: Visual feedback from the survey pilot

Session Two

Respondent Observations:

First respondent finished after 9 minutes with the last respondent taking 14 minutes to complete

Generally girls discussed their answers more frequently than boys

Session Three

Respondent Observations:

First respondent finished after 9 minutes with the last respondent taking 14 minutes to complete

First impressions of the survey seemed positive

Verbal Feedback:

"What do you mean by the phase demographic information?"

"I didn't understand the different sections, seemed the same"

"The question (confidence level test) asking how difficult section A-D wasn't very clear"

"I am unsure what my parents earn after tax"

Verbal Feedback From Pilot Study Two:

"Question 4 didn't know whether I was meant to be circling yes?"

"£12,500 a year for tuition... that's far too expensive"

"It's was ok"

Appendix P: Confidence levels taken from the pilot study

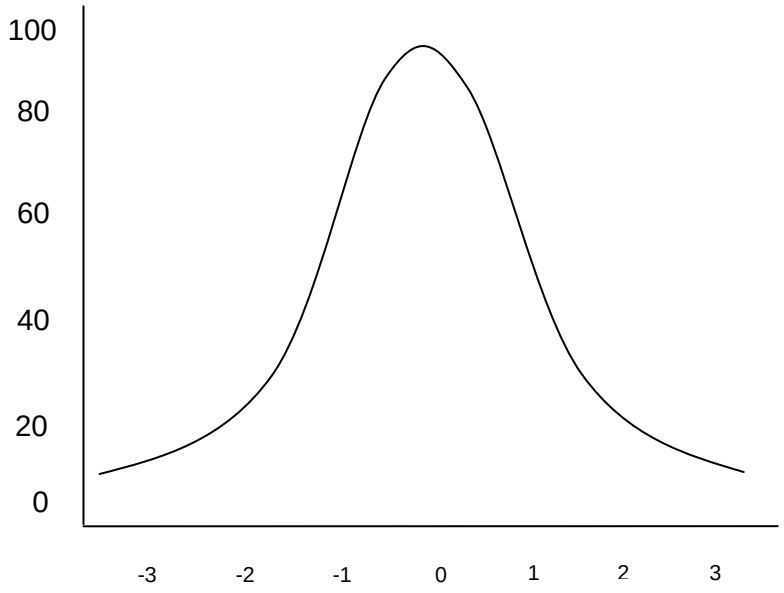
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Easy	1	5.6	5.6	5.6
	Easy	6	33.3	33.3	38.9
	Ok	9	50.0	50.0	88.9
	Difficult	2	11.1	11.1	100.0
	Total	**18**	100.0	100.0	

Confidence levels from the second pilot

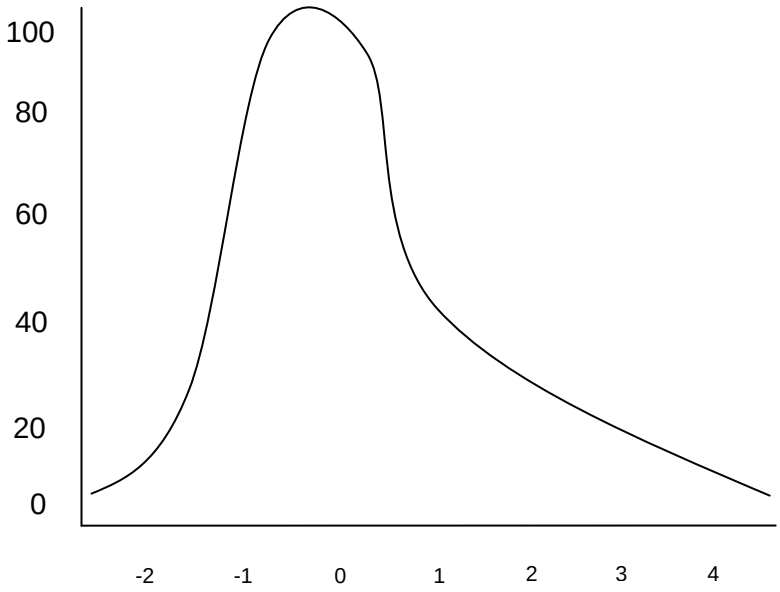
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Easy	5	22.7	22.7	22.7
	OK	15	68.2	68.2	90.9
	Difficult	2	9.1	9.1	100.0
	Total	**22**	100.0	100.0	

Confidence levels from the third pilot

Appendix Q: The Normal distribution curve (adapted from *Saunders et al.* 2009)



Appendix R: The Gumbel distribution curve (adapted from Street and Burgess, 2007)



Appendix S: Creating continuous variables for the logit model

The commands used to generate the continuous variable in Stata

```
------------------------------------------------------------------------------
      name:  <unnamed>
       log:  j:\logitB.log
  log type:  text
 opened on:  12 Oct 2010, 19:15:37

. **first i am going to check the data

. tab Rent

       Rent |      Freq.     Percent        Cum.
------------+-----------------------------------
         No |      1,061       62.27       62.27
        Yes |        643       37.73      100.00
------------+-----------------------------------
      Total |      1,704      100.00

. gen cost=.
(1848 missing values generated)

. replace cost=50 if  FiftyPnds==1
(460 real changes made)

. replace cost=75 if  SeventyFivePnds==1
(460 real changes made)

. replace cost=100 if  OneHundredPnds==1
(460 real changes made)

. replace cost=125 if  OneTwtyFivePnds==1
(460 real changes made)

. tab cost

       cost |      Freq.     Percent        Cum.
------------+-----------------------------------
         50 |        460       25.00       25.00
         75 |        460       25.00       50.00
        100 |        460       25.00       75.00
        125 |        460       25.00      100.00
------------+-----------------------------------
      Total |      1,840      100.00
```

Appendix T: Creating effects codes on Stata for the multinomial design (excluding cost)

```
*Points

gen ec_p_240=p_240
replace ec_p_240=-1 if p_180==1

gen ec_p_300=p_300
replace ec_p_300=-1 if p_180==1

gen ec_p_360=p_360
replace ec_p_360=-1 if p_180==1

*quality

gen ec_q_moderate=q_moderate
replace ec_q_moderate=-1 if q_poor==1

gen ec_q_good=q_good
replace ec_q_good=-1 if q_poor==1

gen ec_q_vgood=q_vgood
replace ec_q_vgood=-1 if q_poor==1

*distance

gen ec_d_90=d_90
replace ec_d_90=-1 if d_45==1

gen ec_d_135=d_135
replace ec_d_135=-1 if d_45==1

gen ec_d_180=d_180
replace ec_d_180=-1 if d_45==1

*contact hours

gen ec_c_18=c_18
replace ec_c_18=-1 if c_9==1

gen ec_c_27=c_27
replace ec_c_27=-1 if c_9==1

gen ec_c_36=c_36
replace ec_c_36=-1 if c_9==1

*structure

gen ec_s_4p=s_4p
replace ec_s_4p=-1 if s_3==1

gen ec_s_4t=s_4t
replace ec_s_4t=-1 if s_3==1

gen ec_s_5=s_5
replace ec_s_5=-1 if s_3==1

**check
```

Number of points

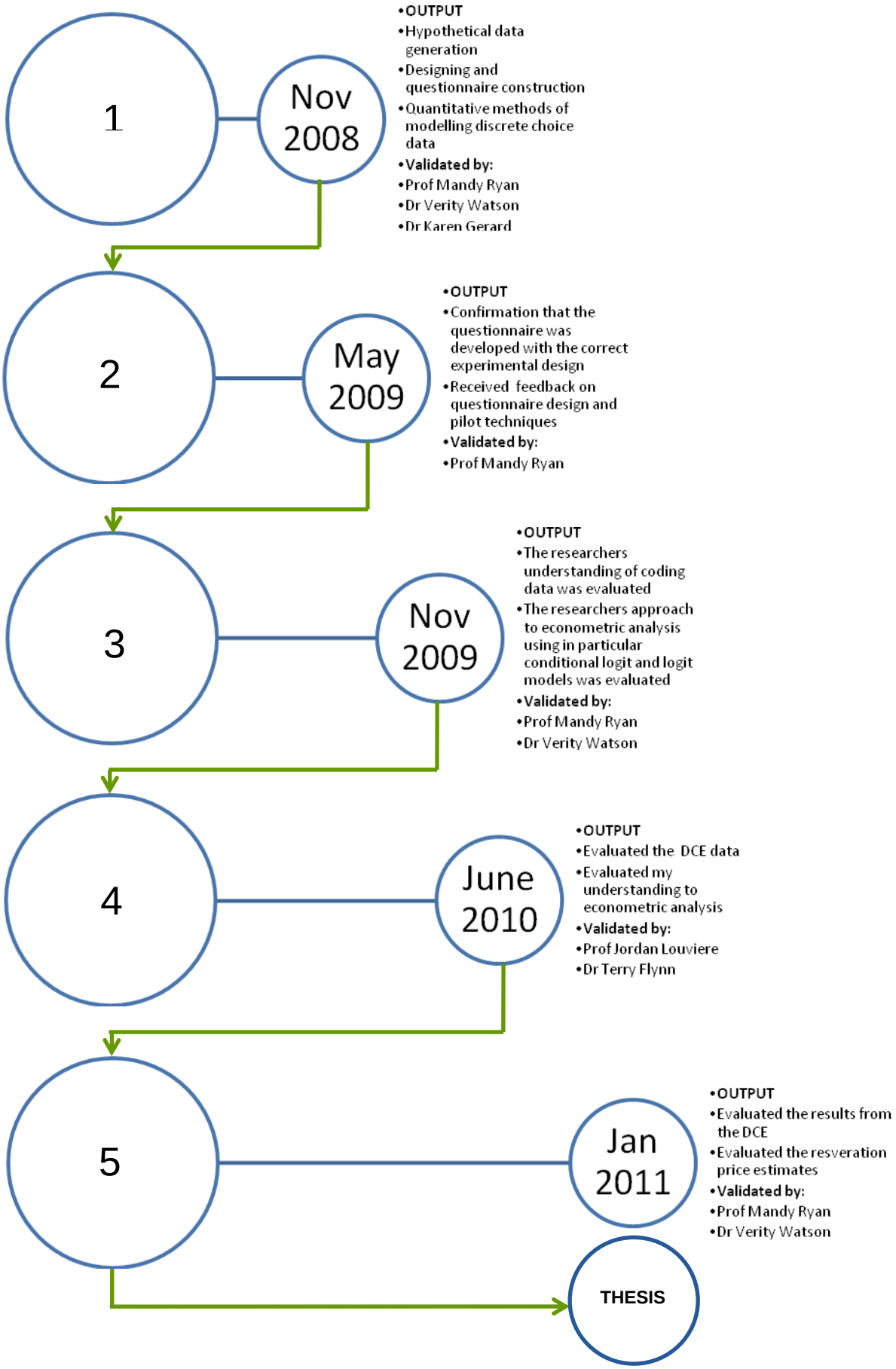
Quality of accommodation

Distance from home

The amount of contact time

Course structure

Appendix U: The 5 stages involved in validating the DCE for this thesis



Appendix V: Ethical consent for the focus group and survey interviews

Organisational consent forms – interviews

RESEARCH **ORGANISATION -** INFORMED CONSENT FORM

Newcastle Business School

University of Northumbria

Completion of this form is required whenever research is being undertaken by NBS staff or students within any organisation. This applies to research that is carried out on the premises, or is about an organisation, or members of that organisation or its customers, as specifically targeted as subjects of research.

The researcher must supply an explanation to inform the organisation of the purpose of the study, who is carrying out the study, and who will eventually have access to the results. In particular issues of anonymity and avenues of dissemination and publications of the findings should be brought to the organisation's attention.

Researcher's Name: Mr Matthew Sutherland

Student ID No. (if applicable): 02183986

Researcher's Statement:

The purpose of this study is to investigate the way in which an increase in price would impact upon students' willingness-to-pay for specific decision making attributes. The investigation is part of a three year full-time, 'Marketing' PhD research project, incorporated within Newcastle Business School ('NBS').

In methodological terms primary data will be collected through the use of focus groups. The framing of questions, the direction of discussion and the actual running of the focus groups will provide the researcher with information that will be attributed to the primary methodological design. The investigation will test how prospective students assign utility to different decision making attributes when entering into Higher Education ('HE').

The focus groups will take place within a school setting and include 6-8 participants who are viewed as being prospective students interested in enrolling in English Higher Education. Participants will be of mixed gender, in the 16 to 18 age range and be interested in following a range of academic subjects. (The researcher holds an enhanced CRB disclosure valid for the full duration of the research project). Information obtained from this study will be treated confidentially in that the results and findings will not be attributed to any individual or organisation taking part.

The data will be gathered over a seven month period, commencing in December 2008. This data will be published as part of the researcher's PhD studies. The name of participating schools will be anonymised.

Data obtained from the investigation will be secured electronically and in a locked filing cabinet with only the researcher having access to the data.

The data obtained from the primary data collection will be published in the researchers' PhD and may take further forms: (such as conference presentations or Journal articles).

If you have any concerns about the nature of the research, please contact:

Matthew Sutherland

Graduate Tutor

Tel: 0191 224 3271

Mobile: 07799 302305

Email: m.sutherland@northumbria.ac.uk

Thank you for your assistance,

Matthew Sutherland

Any organisation manager or representative who is authorised to give consent may do so here:

Name: _____

Position/Title: _____

Organisation Name: _____

Location: _____

Anonymity will be offered to the individuals and the organisations taking part.

Confidentiality is more complex and cannot extend to the markers of the research student's work or the reviewers of staff work, but can apply to the published outcomes.

Signature: _____ Date: _____

This form can be signed via email if the accompanying email is attached with the signer's personal email address included. However assigned hard copy will be preferable.

This form cannot be completed by telephone.

Newcastle Business School

Informed Consent Form for research participants

Title of Study.	Choice Modelling in English Higher Education: An Investigation In To How Price Affects Student Choice.
Person(s) conducting the research.	Mr Matthew William Sutherland
Programme of study.	Full-Time PhD (2nd Yr)
Address of the researcher for correspondence.	Newcastle Business School City Campus East Newcastle upon-Tyne NE1 8ST
Telephone.	Office number: 0191 227 3271 Mobile number: 07799325305
E-mail.	m.sutherland@northumbria.ac.uk
Description of the broad nature of the research.	To organise the running of focus groups as part of my primary data collection. The first five focus groups will be a pilot study. The outcome of the focus groups will provide primary data identifying and prioritising the attributes that prospective students associate with choosing a full-time undergraduate degree programme.

Description of the involvement expected of participants including the broad nature of questions to be answered or events to be observed or activities to be undertaken, and the expected time commitment.	Five focus groups are scheduled to take place as part of the pilot process. The first, will take place at a North Tyneside Secondary School. Participants will be aged between 16- 18 and of mixed gender, (the researcher holds an enhanced CRB disclosure). Participants will be voluntarily selected by the school and their parents/guardian will be informed about the nature of the research. At no time will students' comments be disclosed other than anonymously. Students and their parents will receive a letter informing them of the process. Any student participating will require a completed parental consent form prior to data being obtained. A subsequent focus group is scheduled to take place at Newcastle Business School between 6pm and 8pm on a weekday evening. The setting will provide participants with a relaxed and informal environment in which to join in discussion and offer feedback. For the purpose of the two groups, questions will be structured in order to develop a list of core attributes that stakeholders associate with HE. Participants will further be asked to rank these attributes in order of preference. The intended outcome of this study is to provide the researcher with a weighted list of attributes that a broad range of stakeholders associate with HE.

Information obtained from this study will be kept confidential in that the results and findings will not be attributed to any individual taking part.

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above. It will not be used for purposes other than those outlined above without your permission.

Participation is entirely voluntary and participants may withdraw at any time.

By signing this consent form, you are indicating that you understand the above information and agree to participate in this study.

Participant's signature…….
Date……..

Researcher's signature…….Date……..

Thank you.

Please keep one copy of this form for your own records

University of Northumbria

Newcastle Business School

City Campus east

Room 212

Newcastle upon Tyne

NE1 SST

28th November 2008

HEAD OF SIXTH FORM

School **A**

Dear [HEAD OF SIXTH FORM],

RE: PhD research project: – An Investigation Into How Price Affects Student Choice.

Further to our conversation when we met at School **A** earlier this month I wish to confirm my request to meet with a number of students as part of a focus group in order to explore their views with regards to selecting a university course.

The purpose of this research is to examine in more detail the effect that an increase in price may have on prospective students' preferences, this research being part of a three year doctoral programme (PhD) due for submission in June 2010.

Confidentiality for the students and the schools involved will be assured as the researcher confirms that there will be no direct reference to any of the parties involved. Anonymised data may however be used for future publications as well as this PhD research study.

In addition to the 'organisational consent form' a letter containing more information about the project and the arrangements for the running of the focus groups will be given to each student and their respective parent or guardian. Parents/guardians will be required to provide written consent on the return slip.

Students will be thanked for agreeing to take part in the study. Students' consent signatures will also be required on the day as part of the usual arrangements for research studies being carried out by Northumbria University.

I would welcome the opportunity to give some more detailed feedback to the school in due course when the research is completed.

Thank you for your kind assistance with this project.

Yours sincerely,

Matthew Sutherland

University of Northumbria
Newcastle Business School
City Campus East - Room 212
Newcastle upon Tyne
NE1 8ST

12th January 2009

Dear parent/guardian

RESEARCH PROJECT: – An Investigation Into How Price Affects Student Choice.

You may now be aware that your son/daughter has agreed to take part in this specific research project as part of PhD studies to be held at [**SCHOOL**] in January 2009. The school have given their permission for this piece of work to go ahead.

The research will involve your son/daughter taking part in a 60 minute focus group to discuss their views and opinions when choosing to attend a university. The aim of the project is to examine and evaluate students' preferences in relation to selecting a full-time undergraduate degree programme.

If you have any questions or queries about the nature of the research please don't hesitate to get in touch. Your consent is required before your son/daughter can take part.

Results from the research study will be anonymised so that neither students nor the schools involved will be identified.

Thank you,

Yours faithfully,

Matthew Sutherland

Telephone: 0191 227 3271
Email: m.sutherland@northumbria.ac.uk
By post: Matthew Sutherland
Graduate Tutor
Newcastle Business School
City Campus East
Room 212
Newcastle upon-Tyne
NE1 8ST

I give my consent to my son/daughter (name)……

To attend and take part in the research focus group to be held at [Name of School**] in December 2008.**

Signed……Date……..

(Please print name below)

…….

Your home post code:……..

(Note: this will only be used by the researcher for geographical reference and will not disclosed to any third party)

University of Northumbria

Newcastle Business School

City Campus East – Room 212

Newcastle upon-Tyne

NE1 8ST

27th December 2008

Dear Student,

RESEARCH PROJECT: – An Investigation Into How Price Affects Student Choice.

Thank you again for agreeing to take part in this research study and I look forward to meeting you soon.

I have also enclosed a short letter for your parent/guardian informing them about the nature of the research and requesting their written consent. If you have any questions or queries about the research please don't hesitate to get in touch with me.

Thank you,

Yours faithfully,

Matthew Sutherland

Telephone: 0191 227 3271

Email: m.sutherland@northumbria.ac.uk

By post: Matthew Sutherland

Graduate Tutor

Newcastle Business School

City Campus East

Room 212

Newcastle upon-Tyne

NE1 8ST

RESEARCH **ORGANISATION -** INFORMED CONSENT FORM

Newcastle Business School

University of Northumbria

Completion of this form is required whenever research is being undertaken by NBS staff or students within any organisation. This applies to research that is carried out on the premises, or is about an organisation, or members of that organisation or its customers, as specifically targeted as subjects of research.

The researcher must supply an explanation to inform the organisation of the purpose of the study, who is carrying out the study, and who will eventually have access to the results. In particular issues of anonymity and avenues of dissemination and publications of the findings should be brought to the organisation's attention.

Researcher's Name: Mr Matthew Sutherland

Student ID No. (if applicable): 02183986

Researcher's Statement:

The aim of this study is to develop a utility model that informs universities about how student choice is influenced by price. In terms of investigating how utility is ascribed, six exploratory factors have been identified as impacting upon student choice. This investigation is part of a three year full-time, 'Marketing' PhD research project, incorporated within Newcastle Business School ('NBS').

In methodological terms, primary data will be collected through a self-administered survey. The survey will be provided to students who are interested in entering into Higher Education. Respondents will be of mixed gender, in the 16 to 18 age range and be interested in applying to an English based institution. Information obtained from this study will be treated confidentially; the results and findings will not be attributed to any individual or organisation taking part.

The data will be gathered over a two month period, and will be published as part of the researchers' PhD studies. Participating schools will remain anonymous. Pursuant to the Data Protection Act (DPA) when collecting personal information, children aged 16-17 are presumed competent in most cases of being able to sufficiently understand what research participation will involve and therefore provide informed consent without the requirement for parental involvement. Respondents will be provided to give individual consent before being allowed to participant within the investigation.

Data obtained from the investigation will be secured electronically and stored in a locked filing cabinet to which only the researcher will have access. The information obtained from the primary data collection will be published in the researchers' PhD and may take further forms: (such as conference presentations or Journal articles).

If you have any concerns about the nature of the research, please don't hesitate to get in contact:

Matthew Sutherland

Graduate Tutor

Tel: 0191 224 3271

Mobile: 07799 302305

Email: m.sutherland@northumbria.ac.uk

Thank you for your assistance,

Matthew Sutherland

Any organisation manager or representative who is authorised to give consent may do so here:

Name: _____

Position/Title: _____

Organisation Name: _____

Location: _____

Anonymity will be offered to the individuals and the organisations taking part.

Confidentiality is more complex and cannot extend to the markers of the research student's work or the reviewers of staff work, but can apply to the published outcomes.

Signature: _____ Date: _____

This form can be signed via email if the accompanying email is attached with the signer's personal email address included. However assigned hard copy will be preferable.

This form cannot be completed by telephone.

Newcastle Business School

Informed Consent Form for research participants

Title of Study.	Choice Modelling in English Higher Education: An Investigation In To How Price Affects Student Choice.
Person(s) conducting the research.	Mr Matthew William Sutherland
Programme of study.	Full-Time PhD (3rd Yr)
Address of the researcher for correspondence.	Newcastle Business School City Campus East Newcastle upon-Tyne NE1 8ST
Telephone.	Office number: 0191 227 3271 Mobile number: 07799325305
E-mail.	m.sutherland@northumbria.ac.uk
Description of the broad nature of the research.	To administer a survey that identifies where perspective students assign utility when choosing an English full-time undergraduate degree programme.
Description of the involvement expected of participants including the broad nature of questions to be answered or events to be observed or activities to be undertaken, and the expected time commitment.	A survey will be administered as part of the PhD investigation. The self-administered survey will be distributed across North-East based secondary schools. Year 12 & 13 students, are interested in applying to an English university will be targeted. Respondents will be aged between 16 and 19 and of mixed gender. At no time will

	respondent's comments be disclosed other than anonymously. Finally completion of the survey will be encouraged within a school setting

Information obtained from this study will be kept confidential in that the results and findings will not be attributed to any individual taking part.

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above. It will not be used for purposes other than those outlined above without your permission.

Participation is entirely voluntary and participants may withdraw at any time.

By signing this consent form, you are indicating that you understand the above information and agree to participate in this study.

Participant's signature…….
Date……..

Researcher's signature…….Date……..

Thank you.

Please keep one copy of this form for your own records

Newcastle Business School

Staff Research and Consultancy

Ethical Issues Form

Staff Name:	Matthew Sutherland
Portfolio Area:	MTTM
Title of Research / Consultancy Project:	Choice Modelling In English Higher Education: An Investigation In To How Price Affects Student Choice
Please categorise your research as: Learning & Pedagogical Discipline based Contribution to practice A multiple of the above	Discipline based
How does this research fit in with the NBS ADP? – Which area of excellence from the ADP does the research address? – i.e: Business & Management Practice Leadership & Management Development International Business	Business and Management Practice
Start Date of Research / Consultancy project:	July 2009

	Comments
Brief description of the proposed research methods including, in particular, whether human subjects will be involved and how.	Self-administered surveys will be used to gain an insight into how students ascribe value. Prospective students of school leaver age (16-18yrs) with no previous experience of Higher Education will be targeted to avoid post rationalisation. Respondents will include students from Years 12 and 13 within North-east based secondary schools.
Ethical issues that may arise (if none, state “None” and give reasons)	Target respondents are under the age of 18 years old. This does not include working with vulnerable or special needs students.
How will the ethical issues be addressed? (if none state n/a)	An organisational consent form is provided to every school. This provides detail covering all aspects of the research and requires a signature by the contact of the school before conducting the research. A full set of contact details is also provided in case the school has any additional enquiries. An individual informed consent form is also provided to every respondent taking part in the study. This outlines the purpose of the study and the way the information is going to be used. A full set of contact details is also provided in case a respondent has any additional enquiries. A further precaution when working with under 18’s includes a CRB check. The researcher includes a full CRB check that is valid for the duration of the study. Data obtained from the investigation will be secured in a locked filing cabinet to which only the researcher will have access. The information will be passed amongst the research team. At no time will the information be released and used for commercial success. The information obtained from the primary data collection will be published in the researchers’ PhD and may take further forms: (such as conference presentations or Journal

	articles) Finally all data collected from the study will be anonymised. Furthermore respondents won't be asked to provide their name when completing the survey.
Has informed consent of research participants been considered? If appropriate, has an informed consent form been completed?	Informed consent has been considered and implemented with all research respondents. Individual informed consent will be completed before respondents are administered the survey.
Has organisational consent been considered? If appropriate, has an organisational consent form been completed?	Organisational consent has been considered. Organisational consent will be completed on arrival at the school.

Staff Signature (indicating that the research will be conducted in conformity with the above and agreeing that any significant change in the research project will be notified and a further "Ethical Issues Form" submitted.

Date: ……**Staff Signature**: …….

Line Manager:

I confirm that I have read this form and I believe the proposed research will not breach University policies.

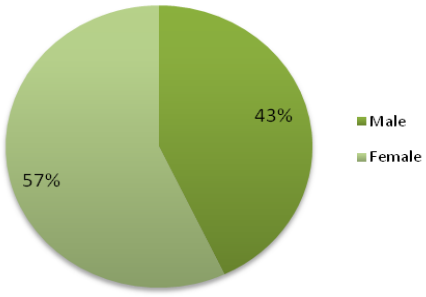
Date: …… **Staff Signature**: …….

Please Note: The appropriate completion of this form is a critical component of the University Policy on Ethical Issues in Research and Consultancy. If further advice is required, please contact the School Ethics Sub Committee through the Academic Support Office in the first instance.

Appendix W: A breakdown of demographics of response information

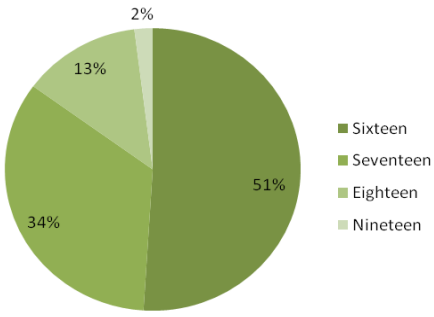
Section **One**

A



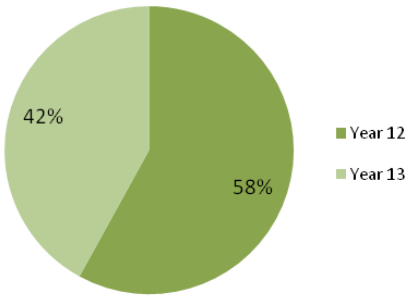
Gender

C



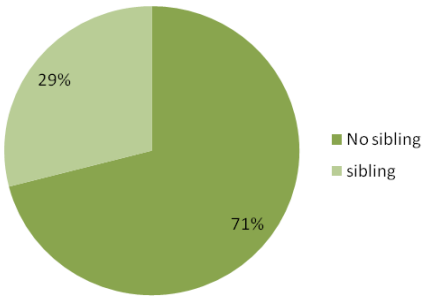
Age

E



Year of study

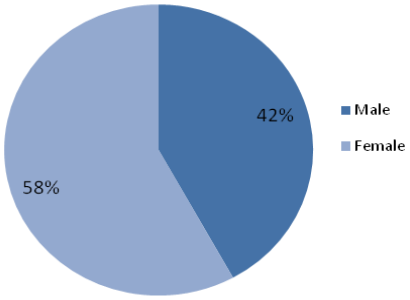
G



No of siblings

Section **Two**

B



Gender

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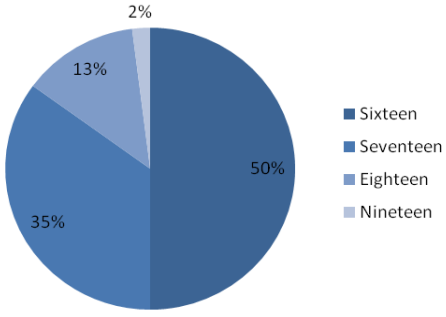

Age

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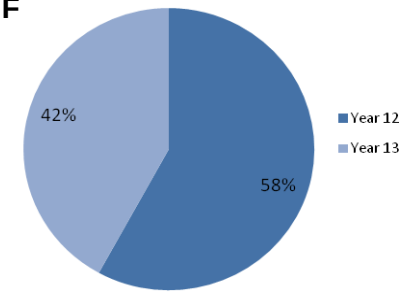
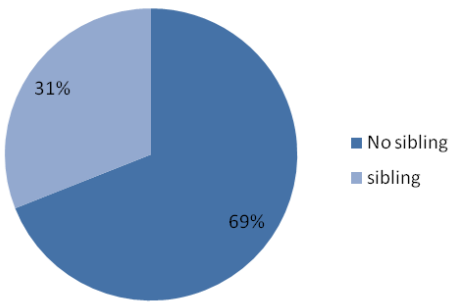


Year of study

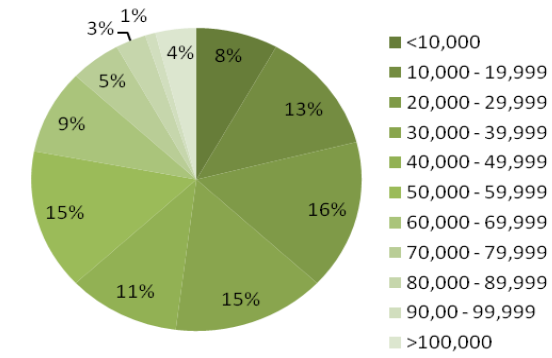
H



No of siblings

Section **One**

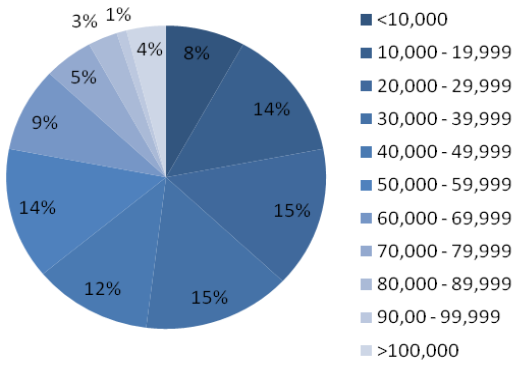
I



Household income

Section **Two**

J



Household income

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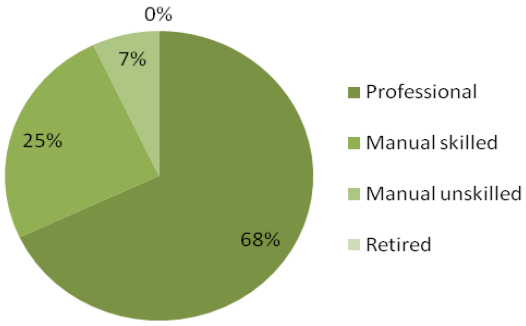
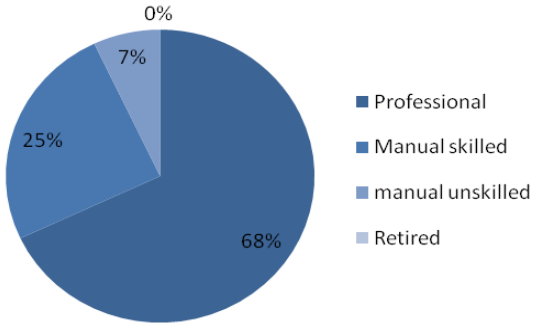


Parent/Guardian occupation

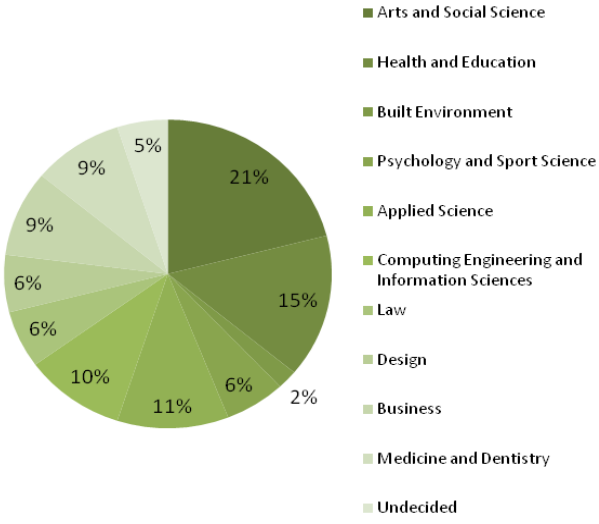
L



Parent/Guardian occupation

Section **One**

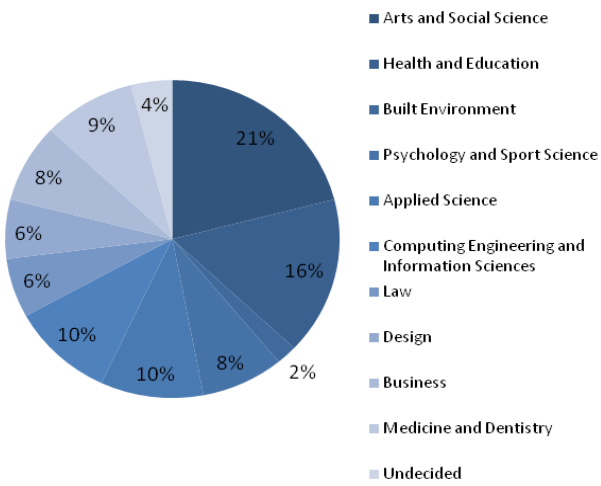
M



Subject area interested in studying

Section **Two**

N



Subject area interested in studying

Section **One**

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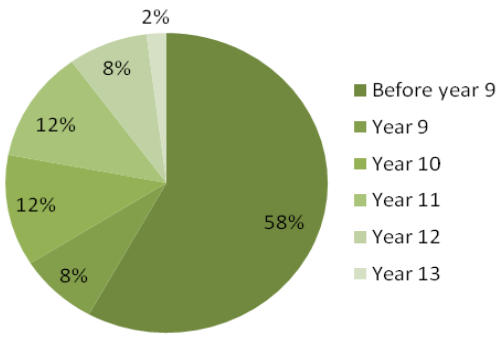
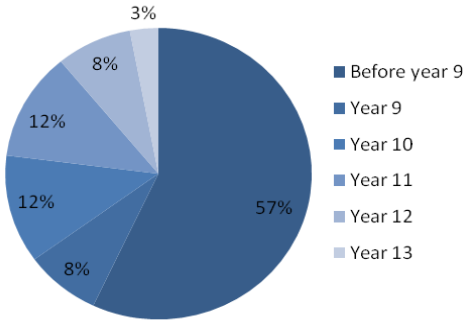


First interested in attending university

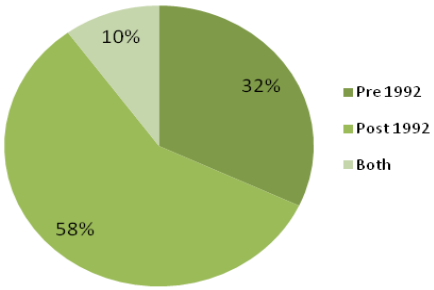
Section **Two**

P



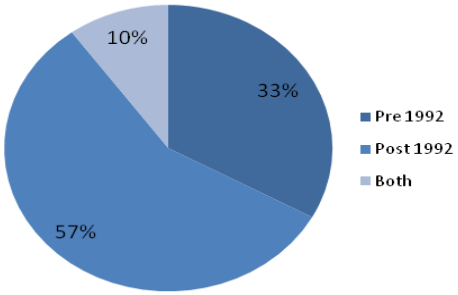
First interested in attending university

Q



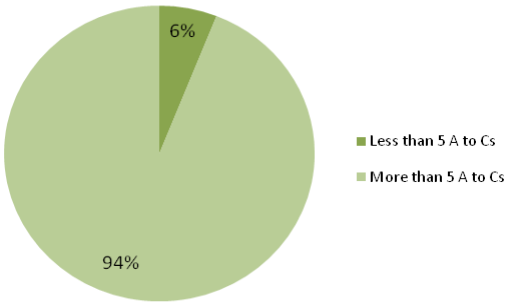
Type of institution

R



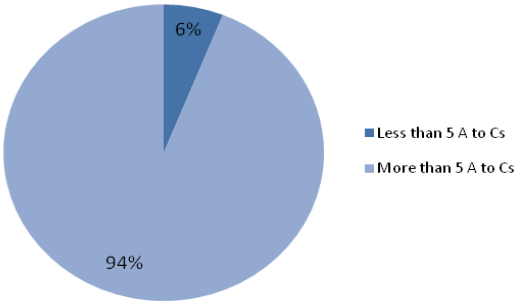
Type of institution

S



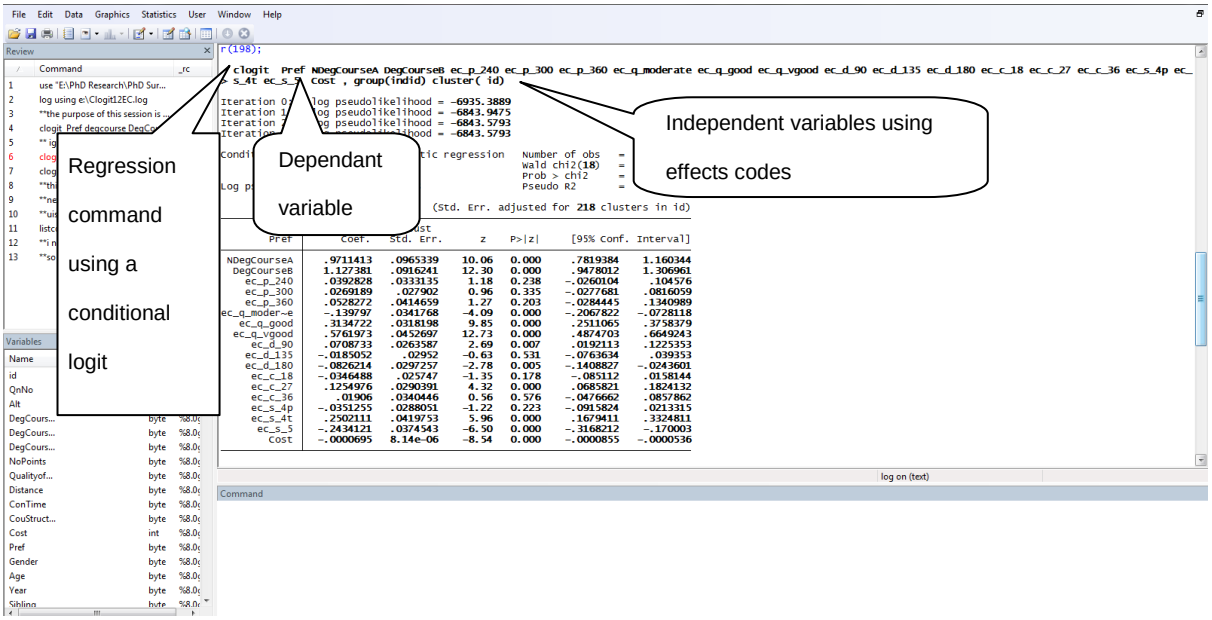
Level of qualifications

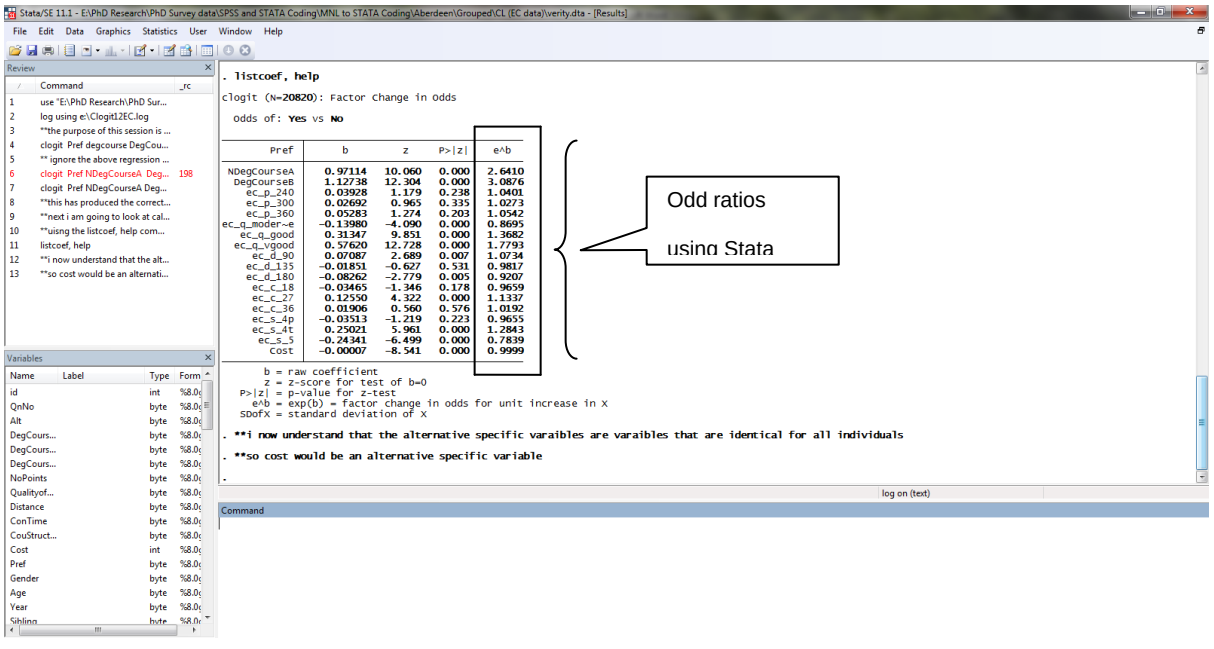
T



Level of qualifications

Appendix X: Using Stata to calculate the odds ratio





Appendix Y: Peer review conference paper

Methodology for business and management studies (ECRM) confidence paper – June 19th-21st 2011 Normandy Business School, Caen, France

Student Reservation Price; how much will Prospective Students pay for Their Undergraduate Degrees?

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Abstract

Tuition fees for home and EU undergraduate students studying at an English Higher Education Institution (HEI) are currently capped at £3,290. However, not all HEIs charge the full tuition fee of £3,290 resulting in some price differentiation in the market. A former Government review assigned to investigate the future of tuition fees in England recommended in October 2010 to entirely remove the fee cap. The UK coalition government have agreed to allow English universities to levy fees up to £9,000 for European and UK students, it is anticipated that this could lead to greater sector wide price differentiation, which may prove to have a significant influence on student behaviour. This paper investigates prospective students' reservation price for their undergraduate degrees in England. A review of the marketing literature outlines a variety of theoretical approaches to estimating consumer reservation price, including: direct (observational) and indirect (hypothetical) techniques. One rare example of estimating student reservation price for English undergraduate degrees uses a direct approach, however no published study has used an indirect approach to investigate prospective students' reservation price. The researcher will outline a more detailed understanding of student reservation price through the indirect approach of Discrete Choice Experiments. As part of an experimental research methodology, Discrete Choice Experiments' believe it is the attributes and levels of a good that determines its utility. The researcher will outline a more detailed understanding of the stages involved in identifying the specific attributes which influence student reservation price for full-time undergraduate degrees. Findings reveal little guidance on how to construct a DCE from a marketing perspective. This paper intends to provide a theoretically alternative approach to estimating consumer reservation price synthesised from the literature and contextualised for the global HE sector.

Key words:

Consumer behaviour

Student reservation price

Discrete choice experiment

Experimental methodology

English Higher Education

Student Reservation Price; How Much Will Prospective Students Pay For Their Undergraduate Degrees?

1.0 Introduction

New approaches to better understanding of consumer behaviour are beginning to emerge and the aim of this paper is to explain how Discrete Choice Experiments (DCEs) may be used to measure consumer reservation price for individual product attributes and hence inform consumer demand. The consumers that are the subject of investigation within the study presented here are potential English undergraduate students who are currently studying at School (Years 12 and 13) and Six Form College. They are about to make a choice of course and university.

This study is particularly relevant and timely in the light of a global financial crisis and a massive reduction in English University state funding as outlined in the Browne Report (2010). Browne (2010) argues that removing restrictions on student numbers will stimulate student choice allowing market forces to develop and prospective students to make critical choices about undergraduate degree courses based on personal need rather than the supply of places. The UK coalition government have already agreed to remove the current English student fees cap of £3290 and allow English universities to levy fees up to £9000 for European and UK students. However this has been done without reference to students 'willingness to pay' and at the time of writing this paper Universities are faced with the dilemma of trying to fix a charge that is appropriate for their own organisation.

The theoretical term used when estimating how much students would be willing to pay in student fees is known as consumer reservation price. At present the main contributions to estimating consumer reservation price research are methodological (Jedidi and Zhang 2002; Jedidi, Jagpal and Manchanda 2003; Jedidi and Jagpal 2009). Empirical investigations into developing consumer reservation price techniques draw heavily from outside of the marketing literature with contributions from environmental, health (Ryan *et al.* 2008) and transport economics (Hensher and Button, 2000). One way of understanding student choice (reservation price) is through the concept of 'attributes' that make up a full–time undergraduate degree course. In line with Lancaster's (1966) theory of consumer choice attributes can be used as a measure of student choice. Despite the attributes that make up a degree course being theoretically recognised to influence student choice, research into the course level choice is nearly none existent. Nevertheless over the last decade some research into attributes that influence international student choice to study overseas has been conducted (Maringe and Carter 2007) but there is none which relates to attributes which influence English student choice to study for an undergraduate degree in the UK.

This research is highly innovative, demands a detailed explanation of how it was conducted and provides some interesting insights into collecting the specific attributes which influence the consumer reservation price for full-time undergraduate degrees in England.

2.0 The Concepts of Student Choice Behaviour and Consumer Reservation Price

Before considering the methodological approach of the empirical study this section briefly explores two concepts essential to understanding the focus of the work.

2.1 Student Choice

Within the Marketing literature the number of studies that have investigated student choice has increased over the last 30 years (Chapman 1986; Coccari and Javalgi 1995; Roberts and Allen 1997; Hagel and Shaw 2010). Many of the studies which have been conducted to date have investigated university level choices (Moogan, Baron and Bainbridge 2001; Soutar and Turner 2002). Furthermore, according to Maringe (2006) only very limited research has been used to attempt to understand choice behaviour for undergraduate degrees. Indeed, he goes on to state that the attributes that influence student choices at course level has received the least amount of attention within the existing body of literature. However, McClung and Werner (2008) suggest that understanding the attributes that influence choice of degree course is essential with the uncertainty surrounding university funding.

In Marketing, traditional worldwide approaches to investigating course level choices have been through evaluation of the attributes students consider important when constructing their choices. However, today only two studies have been developed to investigate the attributes that influence student choice for course level decision making. Attributes considered important near the time of the choice decision include course content, reputation of the course amongst potential employers, quality of teaching (James *et al.* 1999) and graduate employment (Maringe 2006). However, Jackson (1982) argues the evaluation of alternatives is often influenced by a student's characteristics. As a result, Chapman (1986) discovered students often evaluated attributes using internal and external information. For example external sources would include university open days (Heap 2001). Work by Moogan and Baron (2003) suggests that stakeholders such as parents are having a significant influence on the attributes students add into their consideration set.

Decision making at a university level is also based on the product attributes that influence student choice. In fact, Maringe (2006, p. 470) argues: *"course of study decisions tend to be closely related to institutional choice decisions"*, implying similarities to exist between the two groups of literature. One attribute considered important at a university level is *facilities*. Fleming and Storr (1999) first identified the facilities which could have a significant influence on student choice by enhancing the student learning environment. Price *et al.* (2003) discovered availability of computers and library facilities to influence student choices. Other significant factors include the *quality of university owned accommodation*. Further research has identified 'quality' as important and this includes access to en suite facilities, I.T, internet access and cleanliness which influenced student choices (Maringe, Foskett and Roberts 2009). The price of the accommodation was also acknowledged to be a significant influence (Maringe 2006; Price *et al.* 2003). Another attribute to influence student choice is *location*. The location of a degree course is considered a major influence on student preference (Hooley and Lynch 1981; Bayne 2001; Moogan, Baron and Bainbridge, 2001; Souter and Turner, 2002; Moogan *et al.* 1999; Drewes and Michael 2006; Foskett *et al.* 2006). The location is frequently ranked as one of the most important attribute when choosing a university (Moogan *et al.* 1999; Moogan *et al.* 2001; Price *et al.* 2003); acknowledging prospective students consider the distance from their family home to be an important factor when choosing an undergraduate degree course. More recently a study showed that 36% of prospective students would choose a university that was close to home (Great Britain. UK Youth Parliament 2009 cited by the www.bbc.co.uk).

Another attribute that has gained attention due to the uncertain financial conditions is *safety*. Despite safety being more commonly cited within international student choice research (Shanka, Quintal and Taylor 2005 and Abubakar, Shanka, Nkombo Muuka, 2010) there is growing interest in safety at university level choices. The *price* of attending university is another attribute that influences student choice. Despite the recent increase in the price of fees, Hossler and Gallagher (2002) suggest that there is little evidence to suggest that price is a factor in the student decision. Yet, Christie, Munro and Rettig (2001) argue that the cost of university is often under estimated by prospective students, suggesting students give little consideration to the price of admission into university. Maringe *et al.* (2009) discovered no evidence to suggest that the increase in the price of tuition fees would deter student choice. Nevertheless, today the cost of attending university is becoming more of a factor. Swaine (2009) along with Paton (2009a; 2009b) identify prospective students becoming increasingly more price sensitive in their decision to attend university. However, despite this increase in attention for the attribute price no previous study has examined how much students are willing to pay for course fees to attend university.

The final attribute to effect university level choice is *entry requirements*. Entry requirements concern the number points needed to secure a place on a course. Brown, Varley and Pal (2009) found entry requirements impacted on student's decision for university level choices, suggesting the number of points to be linked to universities reputation. Although entry requirements are found to influence choice, little is known within the current literature about the number of points that influence student choice.

2.2 Consumer Reservation Price

Two terms that are often confused and used interchangeably are 'willingness to pay' and 'consumer reservation price' (Jedidi and Zhang 2002). This study uses the term 'consumer reservation price' and is congruent with the term as used in the marketing literature. One of the earliest definitions of consumer reservation price is presented by Hauser and Urban (1986 p. 449): "*the consumer who asked to specify the minimum price of which he/she or they would no longer purchase the durable"* suggesting consumer reservation price to be the price at which the consumer would no longer choose an alternative. Some writers however have acknowledged consumer reservation price to be determined by a consumer's level of utility. For example, Kohli and Mahajan (1991) described consumer reservation price to be: "*determined by his or her (estimated) utility for the product in relation to the price and utility for his or her most preferred product"*, Indeed Jedidi and Zhang (2002, p. 1352) go on to state that: *"a consumers reservation price for specific product is simply the price of which the consumer is indifferent between buying and not buying the product, given the consumption alternatives available to the consumer"* thus suggesting that a change in the price of an alternative can be represented in terms of a change in a consumer's utility. More recent definitions have continued to acknowledge the role of utility. Jedidi and Jagpal (2009) argue that it is this understanding of a customer's utility that is crucial for businesses to discover their customers' reservation price and allow the business to grow. Therefore for the purpose of this study consumer reservation price is represented as a monetary figure for the utility associated with the attributes that make up an alternative and it is this view that will underpin this particular study.

2.3 The different methodological approaches to estimating Consumer Reservation Price

Before considering the approach taken within this study it is important to recognise that a number of options exist as shown in Figure 1:

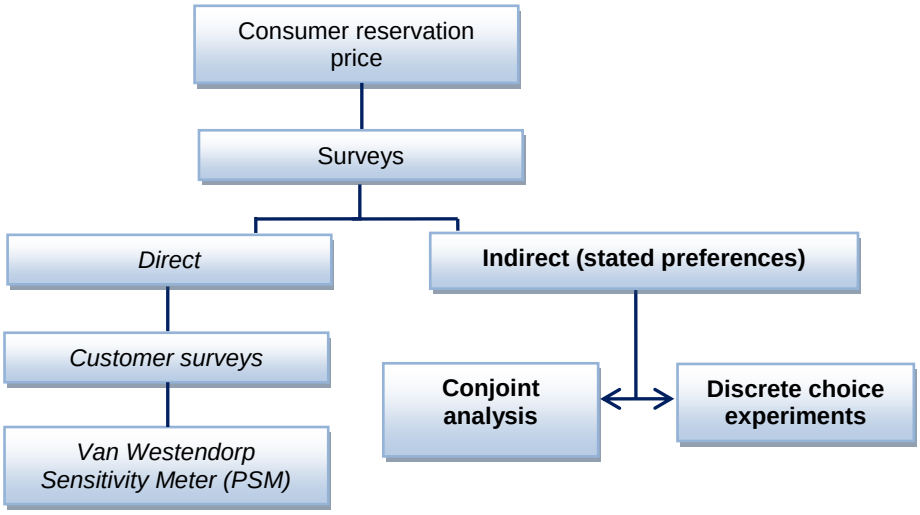

Figure 1: direct and indirect approaches of consumer reservation price (adapted from Breidert, 2006, p. 38)

As can be seen from Figure 1 two streams of research have emerged: one utilising a 'direct' approach using actual market data (Wertenbroch and Skiera 2002), the other adopting an 'indirect' approach. The indirect approaches to consumer reservation price can be described as generating monetary values through measuring utility for customers stated preferences (Louviere, Hensher and Swait 2000). Stated preferences techniques concern the process of eliciting value for non-market goods (Louviere 2000) and can be described as forecasting changes in behaviour in the trade-off between product attributes (Wertenbroch and Skiera 2002). This allows a product preference to be discovered. Measures of preference are known as dominance. Dominance measures are any form of numerical assignment that allows researchers to determine that one or more objects being measured are preferred to one another (Louviere *et al.* 2000; Sattler and Voelckner 2002). One important feature of dominance stated preferences is that it allows marketing researchers to investigate customers reservation price for hypothetical products (Breidert, Hahsler and Reutterer 2006; Wierenga 2008) therefore informing policy making about customer preferences before conventional markets exist.

3.0 The methodological approach adopted for this study ~ Discrete Choice Experiments

Discrete choice experiments (DCEs) as a theoretical approach represent goods in terms of their attributes and levels (Louviere and Woodworth 1983). Thus for example a full-time undergraduate degree course could include entry requirements and the price of the course. The design of a DCE is similar to that of conjoint analysis. However the only difference between the two is within the 'valuation'. Where conjoint analysis provides a measure of an individual's preference for an alternative, DCE calculates an aggregate measure of a population's utility towards an alternative. McIntosh (2003) reports that when summed DCEs can provide a value for any possible of combination of attributes and level. The main advantage of this is that utility for different attributes that make up an alternative can be translated into monetary values. In contrast to conjoint analysis, discrete choice experiments are rooted in the sound behavioural axioms of random utility theory (Thurstone, 1927). Random utility theory assumes part of a consumer's preference towards an alternative is latent and therefore random. Consequently marketing academics can only predict the likelihood that a consumer will ever choose an alternative (Louviere 2000). It is this presence of a random component that Louviere *et al.* (2000) argue allows random utility theory to explain the behaviour of humans rather than the behaviour of numbers. Furthermore it is this stochastic element that has stimulated interest around probabilistic discrete choice models, which recognise the behaviour of various individual choice probabilities in response to changes between the attributes and levels contained with a choice set (Louviere 2000).

Estimation of choice probabilities can be done using logit or multinomial logit (also known as conditional logit) models. Multinomial logit models are preferred as many of the statistical properties have been developed to allow two or more choices to be estimated. Two studies that have used multinomial logit models to examine student choice are presented in Punj and Staelin (1978) and Holdsworth and Nind (2005). Closer inspection revealed the results from these studies informed marketing academics about the attributes that influence student choice at a university level.

There are a number of stages involved in designing a DCE for estimating consumer reservation price and these are outlined in Table 1:

Stage 1 ~ conceptualising the choice process	Determine type of DCE – multinomial or binary
Stage 2 ~ Establish the attributes and assign levels (values) to each attribute	There are no rules determining these and it can be an individualistic process (Ryan *et al.* 2008) Two considerations include: levels should be realistic and should be equally spaced
Stage 3 ~ Develop choice scenarios using experiential design techniques	Develop choice sets and structure surveys.
Stage 4 ~ Elicit consumer preferences	Done through a survey developed in previous stages
Stage 5 ~ Estimate the regression equation to assign weights to attributes	Analysis using probability models allows prediction of unknown outcomes based on known parameters. Maximum likelihood estimates allow estimation of unknown parameters based on known outcomes Louviere *et al.* (2005) shows how DCEs are parameterised in terms of utility from individual coefficients with consumer reservation price being discovered from estimated coefficients
Stage 6 ~ calculating aggregate reservation price estimates	Done by dividing the parameter estimate for the attribute with the estimate taken from the cost coefficient

Table 1: Stages of Development of a DCE

In order to understand how this is done empirically the next section will consider the primary research conducted in this study.

3.1 A DCE study in the North East of England

This study was conducted with secondary school students in a number of NE England schools or Sixth form colleges. These consisted:

3 state schools – free admission

1 independent fee paying school

As the students ages were between 16-19 years the researcher who carried out the data collection had to obtain ethical clearance and a police check before embarking upon the study.

There were six stages to this DCE study:-

Stage 1 – Binary or multi-alternative DCE?- This study incorporated both and is discussed in Stage 3.

Stage 2 – Determining the product attributes

Attributes were generated over a three month period through a series of four focus groups and five face to face interviews. Bloor, Frankland and Robson (2001) describe focus groups as a number of organised discussions that provide an insight into meanings, expose processes and challenge normative thinking. Krueger and Casey (2001) argue that when working with young people a group presence can encourage conversation. The objectives of the focus groups were:

- To discuss the attributes, identified from the literature, that prospective students may consider influence their choice of degree course

- To uncover the hypothetical economic valuations placed on a set of specific decision making attributes
- To uncover a price proxy for how much prospective students are willing to pay to attend university

The focus group participants were volunteers and were chosen on the basis that they were interested in going to university to enrol on a full-time undergraduate degree and that they had no previous experience of attending university as a full-time student. A gender balance was also important.

During the focus group sessions participants were given nine cards with preliminary product attributes. They could discuss them but were not asked to rank attributes. They were then asked to consider levels (values) associated with each attribute e.g. participants were asked to consider how they felt about distance from home and how much they individually would be willing to travel for the degree course of their choice. Students were finally asked how much they would be prepared to pay for the degree course that contains all of the best values contained within the nine product attributes. At the end the range and method of payment was tested and cost in pounds represented an appropriate payment vehicle.

To supplement the focus groups 5 individuals, who from the literature were identified as having influence in the student university decision making process, were recruited:

An admissions officer (Murphy 1981)

A parent (Dahl, 1982 and Hearn 1984)

A student recruitment officer (Hossler and Hu 2000)

HE careers advisor (Moogan *et al.* 1999; Hayes 1989; Hossler and Gallagher 1987; James *et al.* 1999; McClung and Werner 2008)

Head Teacher (Maringe 2006; Foskett *et al.* 2006).

All of the qualitative data captured at this stage was transcribed and analysed using Nvivo8. By analysing patterns and themes levels for each attribute could be determined.

Stage 3 - Develop Choice Scenarios using experimental design techniques. Two different approaches were designed in order to estimate student preference. This was because outcomes taken from the analysis of the Stage 2 study could not be ignored, suggesting the attribute 'facilities' revealed equal preference for both the quality and price of university accommodation. The first was based on a multinomial design in order to estimate course level preferences. The second was based on a smaller binary design and was developed to model student preferences towards renting first year accommodation.

Huber and Zwerina (1996) outline four criteria to consider when constructing a survey, namely: orthogonality, level balance, utility balance and minimal overlap. However obtaining a balance between the different criteria is a matter of judgment since improving some of the criteria can come at the expense of others (McIntosh 2003). The main criteria adhered to in this study were orthogonality, level balance and minimal overlap. Orthogonality was developed using a fixed orthogonal array taken from Sloan's website (http://www2.research.att.com).

The first design was based on a fixed orthogonal array made up with 6 attributes each with 4 levels. A main effects fractional factorial design was constructed comprising of 32 choice sets. Although designed originally to be capable to measure up to nine attributes only six of the columns were used. In fact the removal of columns is proven to be an effective approach of reducing the size of a design without comprising orthogonality (Hensher *et al.* 2005; Burgess and Street 2007).

The second model was based on a binary design which assumes choice between an alternative to be dichotomous. In total 8 choice sets were developed to estimate student

preference based on a main effects mixed orthogonal array taken from Sloan's website (http://www2.research.att.com) containing 5 attributes, 4 with 2 levels and 1 with 4 levels. Again level balance was tested (Huber and Zwerina, 1996. At this point the choice sets were constructed manually in line with Street *et al.* (2005) technique. Finally the binary design was also generically labelled with a degree of freedom of 6 (A+1 or 5 attributes + 1=6), leaving 2 degrees of freedom to estimate error terms at the individual level. The exercise finished by randomising the questions.

Finally, the design of the survey was also carefully considered with an example question also included to provide contextual information to the respondents (Hensher *et al.* 2005). This survey was then piloted through a series of three sessions with a sub-set of the target student population.

Stage 4 - Elicit Consumer preferences. A total of 746 surveys were distributed during one week in November 2009 to students that met the required criteria for the study in the respective secondary schools.

Stage 5 - Estimate the regression equation to assign weights to attributes. Louviere *et al.* (2000) argues that when analysing choices collected as part of a DCE, probability models provide a powerful way to access the relationship between a response variable (or dependent variable) and one or more independent variables. A review of the DCE literature finds *conditional logit models* to be popular for analysing multinomial designs that combine case–specific and alternative specific variables (Louviere 2000) with *logit probability models* being more commonly used to analyse data following a binary design (Louviere *et al.* 2000). The degree of a change in the relationship is discovered using logistic regression analysis. According to Tabachnick and Fidell (2006) logistic regression is appropriate when the independent variables that make up an experiment are a mixture of *categorical variables* where a variable has two or more categories and there is no intrinsic ordering to the category and *continuous variables* when any value of a variable is possible and therefore multivariate normality assumptions will not hold.

The researcher must also pay attention to 'goodness of fit' (Tabachnick and Fidell 2006) and the validity of the data (Bateman *et al.* 2002). These will not be discussed within the paper but were given great consideration.

The analysis began with the data uploaded from the completed surveys and stored onto PASW Statistics 18 (formally SPSS) before being transferred onto Stata (Version 11). The first step in the study was to analyse the *binary data*. It is commonly accepted that the *logit model* is the most straightforward model to interpret. This revealed that the data contained no missing values and analysis of the data could proceed. In order to examine the impact of price of respondent's choice of accommodation a new continuous variable for the attribute cost was created. The logit command on Stata was then used to run the logistic regression command. The second step in analysing the binary data was to test the logit model overall goodness-of-fit. This involved performing a likelihood ratio test, a Wald test and McFadden (1974) Pseudo R^2 using Stata.

Long and Freese (2007) explain how the *conditional logit model* is popular for analysing *multinomial designs* that combine case –specific and alternative specific variables, (e.g. when the choice for an alternative has more than two choices). The process of analysis began by creating dummy variables for each of the 6 attributes within the design, in order to check the non-linearity of the design. This reduced the number of levels down from 4 to 3. Following this Stata was used to examine the conditional logit models overall goodness-of-fit. This involved using a Wald Chi2 test, McFadden (1974) pseudo R^2 and the Wald test. It's important to note that likelihood ratio tests are unable to be developed when the data is developed into clusters, this is because observations are consider no longer independent. Indeed, similar to the logit model additional goodness-of-fit tests were performed to gather as much information about the model.

Stage 6 - Calculating aggregate willingness to pay estimates. Ryan *et al.* (2008) argues that when cost is included in a DCE consumer reservation price can be estimated. They go on to explain that this can be calculated by dividing the value of a parameter estimate taken from the attribute, e.g. location by the parameter estimate taken from the cost attribute. For example when examining students preference for first year

accommodation, *everything else is equal* respondents reservation price for being located close to the university campus - (β_1/β_5) = £115.42.

It's important to note that consumer reservation price estimates can only be developed for data that classed as significant at a 95% confidence interval. Accordingly, reservation price estimates were generated for all of the attributes included in the binary design and 4 of the 6 attributes included in the multinomial design. Attributes considered to have a negative influence on student choice of degree course were distance from home and price. Results from this study indicate students are willing to pay the most for high quality first year accommodation and are willing to pay more for a course with at least 27 hours of teaching per week. Indeed, these results provide further support for the theoretical validity of this technique indicating to be a statistically appropriate method for estimating student reservation price.

4.0 Conclusion

This paper has reviewed and discussed the application of DCEs from a clearly marketing perspective. The benefits associated with DCEs have been discussed highlighting the capacity to estimate consumer reservation prices. The ability to estimate how much consumer will pay for a product or service has wide scale policy advantages. In particular, new changes in the price universities can charge for tuition fees in England suggests demand the application of DCEs are likely to increase over the next few years.

Despite these advantages the application of DCEs to estimate consumer reservation price remains low. One suggestion could be that there remains little guidance on how to plan and construct a DCE. Although developed originally within marketing (Louviere and Woodworth, 1983) more recent contributions in how to construct a DCE are found within the health economic literature (Lancsar and Louviere, 2008). Despite, being useful many focus on using DCEs for economic evaluation for example such as measuring welfare. The research presented in this paper has outlined the steps required to design and deliverer a DCE from a firmly marketing perspective. Analysis of the results are still continuing and will be available within the next six months.

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