Value of Time and Value of Work Time during Public Holidays

University of South Australia

University of South Australia | Institute for Choice

Report prepared by
Professor John Rose
The Institute for Choice
Level 13 140 Arthur Street
North Sydney
NSW Australia 2060
i4c@unisa.edu.au

for

Australian Business Industrial and the New South Wales Business Chamber

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Executive Summary

ES.1 Study Background

This report documents a study undertaken by the Institute for Choice (I4C), located at the University of South Australia. Conducted on behalf of the Australian Business Industrial (ABI) and the New South Wales Business Chamber (NSWBC), the study represents part of a submission to the four yearly review of modern awards currently being conducted by the Fair Work Commission. The project was initially scoped with Mr Dick Grozier, Director Industrial Relations for Australian Business Industrial. The study seeks to examine the importance and value employees covered by the Restaurant Industry Award 2010 and the General Retail Industry Award 2010, place on time. Of particular interest is the importance and value employees covered by these two awards have for working "unsocial hours", with a particular emphasis on working on a public holiday.

The study discussed herein involved several research phases. Initially, a prototype internet based questionnaire was developed by I4C to capture information as well as the relative importance of the activities sampled employees undertook over the course of the previous week. Survey questions designed to determine the knowledge and importance of public holidays were also developed for the survey. The centrepiece of the survey consisted of two discrete choice experiments designed to recover the hourly pay rate for which employees are willing to work during both a normal work week and during a week in which one or more public holidays fall. Two focus groups, moderated by an external independent consultant, Professor Stephen Holden, were undertaken during the week of 8th April 2015. Consisting of 16 respondents in total, the focus groups were designed to test the feasibility of the proposed survey as well as to determine respondent reactions to the questionnaire itself. Based on the findings of the two focus groups, a number of relatively minor changes were made to the survey in order to reduce the cognitive burden placed on respondents completing the survey, as well as to fix a number of minor errors such as question wording and spelling.

The main field phase for the study commenced on the 20th May 2015 and concluded on the 29th May 2015. Respondents, recruited by the marketing research firm Stable Research, were asked to attend a central location near either their workplace or home, where a person provided by ABLA introduced the survey and oversaw the completion of the survey. Respondents were recruited from all states and territories with the exception of the Northern Territory. A total of 472 respondents completed the survey in this manner, however after data cleaning, data from a total of 443 respondents was retained for the purposes of this report.

Data from the survey was reformatted using Microsoft Excel so as to construct several different databases, each designed to answer one of three research questions. Data analysis using several techniques was performed using a range of different software packages, from which conclusions were drawn.

The following sections summarise the specific research questions addressed by this study, as well as the results and conclusions drawn from the analysis undertaken.

ES.2 Research Questions Addressed

The research described within this document seeks to answer three specific questions of relevance to the Fair Work Commission. These are:

ES.2.1: Identify relative importance placed on time

The first research question seeks to determine how important different times of the day are for sampled respondents, where importance is defined in terms of either a willingness or ability to substitute activities occurring at different times of the week for work. To address this question, respondents were asked to complete a diary recording their activities for the week prior to undertaking the survey, were for each activity recorded, importance was measured using a six point scale (where 1 = could never change that activity, to 6 = could very easily reschedule or change the activity). This data is then used to construct heat maps of importance over a week long period.

ES.2.2: Identify knowledge and importance of public holidays

The second research question seeks to identify the level of knowledge employees under the two Awards have about public holidays as well as how importantly they rate the various public holidays that occur over the course of a year. Knowledge of public holidays was captured using an open ended unprompted recall question, where respondents were asked to name the public holidays associated with the State where they current work. Next, respondents were told the relevant holidays for their state, and asked to complete a constant sum exercise involving the allocation of 100 points across the public holidays to indicate relative importance or relative preference for each of the public holidays shown.

ES.2.3: Identify relative value of time for normal and unsocial working hours

The last research question seeks to determine the hourly pay rate for the sampled population for which they are willing to accept an offer to work a shift, either during a normal work week or during a week on which a public holiday falls. This value represents the value of work time for the sample. Respondents completed two discrete choice experiments (DCE) in which they were presented with several scenarios involving a number of work shifts described by varying levels of hourly pay rates, number of hours worked, time of day and day of shift. The hourly pay rates shown in each scenario were pivoted both plus and minus around the current award rates. Given the shift described, respondents were able to indicate whether they would work that shift or not. Based on this, it is possible to model the influence hourly pay rates, as well as other characteristics of the shift, such as time of day, length of shift, etc. has in determining whether an employee will accept to work or not. The first DCE related to a normal work week, based on the previous week as described by the respondent in the activity diary. In the second DCE, respondents were told to assume that a public holiday fell on one or more of the days of the week, thus allowing a determination of the value of work time not only for a normal work week, but also for working on a public holiday.

ES.3 Research Findings

Given the survey data, the following results were obtained for this study.

ES.3.1: The relative importance placed on time

As part of the survey, respondents were asked to complete a diary of their activities for the week prior to when they undertook the survey. To limit cognitive burden, respondents did not have to detail what they did for each block of time during the week, rather they were asked to complete information on activities that they could recall to have occurred. For each activity recorded,

respondents were asked to indicate how important the activity undertaken was to them using a six point scale, where importance was defined as an ability or desire to change that activity should a conflicting event, such as a work shift, arise at the time of the activity. The scale used was such that one represented an activity for which the respondent could not or would not change under any circumstance and six represented an activity that they would very easily reschedule or be willing to change should an unexpected scheduling conflict occur.

Table ES.1 presents the average time importance for the sample by day and time of day. For the sample, the average importance rating was 2.821 suggesting that respondents mostly view their time as being somewhat difficult to change, or would be somewhat unwilling to change their activities should an unexpected event arise. Very little variation exists between days of the week, with average ratings ranging from 2.721 for Tuesdays to 2.907 for Fridays. More variation exists within each day, with an average importance rating of 2.660 for the hours between 6am and midday, increasing to 2.878 between the hours of 1pm and 5pm, with a further increase to 3.213 between the hours of 6pm and midnight, before dropping to 2.569 for the hours between midnight and 6am. This suggests that on average, the sampled population place more importance on their time prior to midday, and after midnight compared to other hours of the day, with the least important time being between 5pm and midnight.

With the exception of Fridays, the most important time, represented by the lowest average rating for the day highlighted grey in Table ES.1, is either 6am to 7am or 7am to 8am. For Fridays the most important time of day for respondents is 4am to 5am. The least important time (shaded blue in the table), is between 9pm and 10pm for Monday through Thursday, and 8pm to 9pm Friday and Saturday. For Sunday, 9pm and 10pm represents the least important time of the day.

Table ES.1: Reported time importance by day and time of day

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Average
6AM	**2.270**	2.413	2.351	**2.387**	2.727	**2.352**	2.464	**2.423**
7AM	2.276	**2.256**	**2.312**	2.565	2.809	2.582	**2.403**	2.458
8AM	2.514	2.454	2.457	2.565	2.864	2.773	2.618	2.606
9AM	2.643	2.651	2.660	2.566	2.843	2.754	2.639	2.679
10AM	2.765	2.776	2.840	2.651	2.948	2.868	2.756	2.801
11AM	2.749	2.82	2.917	2.675	2.911	2.877	2.836	2.826
12PM	2.781	2.792	2.834	2.704	2.927	2.89	2.875	2.829
1PM	2.841	2.752	2.793	2.718	2.925	2.952	2.896	2.840
2PM	2.796	2.732	2.864	2.693	2.929	2.984	2.900	2.843
3PM	2.787	2.746	2.773	2.743	2.863	3.009	2.956	2.840
4PM	2.926	3.005	2.911	2.757	2.887	2.976	3.083	2.935
5PM	3.048	2.917	2.910	2.770	2.876	2.952	3.068	2.934
6PM	3.236	2.916	3.021	2.910	3.171	3.192	3.121	3.081
7PM	3.316	3.150	3.247	2.913	3.356	3.280	3.275	3.220
8PM	3.453	3.204	3.412	3.047	**3.421**	**3.386**	3.444	3.338
9PM	**3.464**	**3.327**	**3.535**	**3.138**	3.379	3.372	**3.603**	**3.403**
10PM	3.355	3.180	3.411	3.012	3.127	3.045	3.574	3.243
11PM	3.069	2.969	3.250	2.684	2.898	2.824	3.266	2.994
12AM	2.653	2.670	2.647	2.812	2.644	2.627	2.618	2.667
1AM	2.640	2.532	2.673	2.670	2.721	2.576	2.564	2.625
2AM	2.552	2.594	2.554	2.697	2.747	2.649	2.581	2.625
3AM	2.521	2.539	2.452	2.585	2.682	2.574	2.500	2.550
4AM	2.551	2.449	2.42	2.497	**2.553**	2.468	2.412	2.479
5AM	2.588	2.395	2.325	2.545	2.568	2.406	2.454	2.469
Average:	2.825	2.760	2.815	2.721	2.907	2.849	2.871	2.821

Differences of time importance are also examined across a range of socio-demographic segments, including age groups and award types. Minor variations are observed within the data. For example, those employed under the General Retail Industry Award 2010 tend to report lower time importance across all parts of the day compared to those employed under the Restaurant Industry

Award 2010 (i.e., 2.931 compared to 2.704), however any differences observed are not statistically significant, with the greatest differences being for Fridays (i.e., 3.075 compared to 2.777) and for the hours between 6pm and midnight (2.935 compared to 2.233).

The largest age based differences in reported importance of time exists between those aged between 25 and 34, and respondents aged 45 to 54. Overall, the older respondents value their time less than the younger respondents (3.251 compared to 2.715), and hence report being more flexible in terms of their ability to reschedule their activities during the week. Large differences exist for all days except Tuesdays between the two groups, particularly for Fridays and Sundays (3.567 compared to 2.795 and 3.696 compared to 2.797 respectively). Little differences are observed for the hours between 1pm and 5pm for the two groups, however large differences exist for all other time periods, particularly after 5pm (3.745 to 2.91).

ES.3.2: Knowledge and importance of public holidays

Respondents were asked to nominate the public holidays relevant to the state in which they were currently working. The most commonly recalled holiday was Easter, either in a generic sense, or via mention of at least one specific Easter related public holiday. Overall, from states in which Easter Saturday is a public holiday, it was mentioned by 10.88 percent of respondents, whilst Good Friday was specifically recalled by 32.96 of respondents and Easter Monday by 22.12 percent. Overall, however Easter as a generic holiday was mentioned by 30.49 percent of the sample. The most commonly mentioned standalone public holiday was Christmas Day with 66.59 percent of respondents, followed by ANZAC day (61.63 percent) and Australia day (54.40 percent). Surprisingly, the Queen's birthday holiday (53.95 percent) was recalled more often that News Year's day (45.60 percent). The Melbourne cup public holiday was mentioned by 48.28 percent of respondents from Victoria, with the remaining state based public holidays receiving much fewer mentions, suggesting that respondents have a greater propensity to recall national based holidays than state based ones.

Respondents were also asked to complete a constant sum task involving the allocation of 100 points across the public holidays as a way to indicate the relative importance of each public holiday. To successfully complete this task, respondents were provided with complete list of all the relevant public holidays for their state, including national public holidays. Table ES.2 presents the average points allocated to the national public holidays for the entire sample of 443 respondents. From the Table, Christmas day dominates as being the most important holiday for the sample, followed by New Year's Day. The least important public holiday is the Queen's birthday holiday, followed by Easter Monday. State based comparisons were also conducted as part of the report. Across all states, Christmas day was rated the most important public holiday followed by are News Year's Day, Boxing day, ANZAC day and Australia Day, with the exception of the later public holiday for workers from the ACT who rated Easter Monday and Saturday, and even Canberra day as being more important. The State based public holidays tended to be rated much lower than Australia wide public holidays. On average, the state specific public holidays rated 3.52 out of 100. Importantly, this number is elevated due mostly to ratings related to Easter Monday and Sunday which are not public holidays in all states, and New Year's Eve which is a public holiday in only one state (South Australia). Excluding these public holidays from the analysis, the average rating allocated to state based public holidays falls to 2.72 out of 100.

Table ES.2: Relative Public Holiday importance

	Average allocated value
Anzac Day	6.27
Australia Day	8.49
Boxing Day	8.28
Christmas Day	23.45
Easter Monday	4.48
Good Friday	6.44
New Year's Day	13.90
Queen's Birthday	2.50

ES.3.3: Relative value of time for normal and unsocial working hours

Based on a series of discrete choice experiments (DCE), the final analysis conducted for this report examines the hourly pay rates for which respondents would be willing to accept offers to work during both normal working weeks and weeks in which a public holiday falls. As such, the results for this final analysis reflect more than simply the importance of time, providing direct estimates of the value of work time for the sampled population. The DCEs employed for the current study involved presenting surveyed respondents with a series of scenarios described by several work shifts, each further defined by differing hourly pay rates, shift lengths, start and finish times, and the day on which the shifts are to occur. The two DCEs are identical with the exception being that in the second DCE, respondents were also informed that one or more of the shifts offered falls on a public holiday. For each shift thus described, respondents were asked to indicate whether or not they would accept to work that shift. Based on the responses provided, a number of simultaneously estimated correlated Probit models was estimated in order to determine the average hourly pay rate threshold at which the sampled respondents would accept to work a shift. In total, four separate modelling exercises were performed, two for each of the award types pertinent to this current study. For each award type, separate models were estimated for the data in which no public holiday was assumed and for the data in which a public holiday was assumed to fall. The separate models allow for respondents to employ different choice strategies when selecting which shifts to work, particularly given that public holidays attract a higher hourly pay rates than non-public holidays, and hence, allow respondents to earn the same or more money whilst working less hours during a week in which a public holiday is present.

The modelling results thus obtained are presented in Table ES.3. Rather than present absolute values of time, the results are presented as percentage changes relative to the average hourly pay rate for a normal work day (i.e., non-public holiday) as reported for each of the sample segments (i.e., $21.95 for those employed under the Restaurant Industry Award 2010, and $21.92 for those employed under the General Retail Industry Award 2010; see Table 6 in main body of the report). The presentation of the results as percentages rather than absolute values is necessary given that on average, the sampled respondents report being paid above award rates, and hence, their value of time can be expected to be relative to their existing payment arrangements, not the base award rate values. Also shown in the Table are the 95 percent confidence intervals reported as percentages, calculated based on the reported average hourly pay rates for each of the segments.

Table ES.3: Value of time as percent of currently reported hourly pay rate

	Restaurant Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	97.93% (89.91% - 105.95%)	95.20% (82.61%-107.79%)	124.35% (96.76%-151.93%)
Saturday	135.14% (103.12% - 167.16%)	121.16% (77.45%-154.55%)	150.31% (91.60%-198.70%)
Sunday	146.21% (96.88% - 195.54%)	126.40% (72.75%-160.32%)	155.55% (86.90%-204.47%)
	General Retail Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	112.22% (100.50% - 123.95%)	105.38% (95.72%-115.04%)	164.68% (150.38%-178.99%)
Saturday	112.22% (100.50% - 123.95%)	106.62% (122.74%-144.53%)	165.92% (177.40%-208.48%)
Sunday	156.93% (115.60% - 198.26%)	165.14% (64.22%-203.05%)	224.44% (118.87%-267.00%)

Several hourly pay rate thresholds at which the sampled respondents were more likely than not to choose to work are provided in Table ES.3. For those falling under the Restaurant Industry Award 2010, the threshold hourly pay rate to work on a non-public holiday is 97.93 percent of the average reported hourly pay rate if the day occurs during a normal work week (i.e., a week with no public holidays) and 95.20 percent of the average reported hourly pay rate if a public holiday falls sometime during the week. Examination of the confidence intervals suggests that neither of these values are statistically different to the average reported hourly pay rate for the sample, or statistically different from one another. This later point indicates that the sampled respondents place the same value of time for working on non-public holidays, irrespective of whether a public holiday falls sometime during the work week or not. Overall, this finding suggests that the current hourly pay rate for a normal working day is consistent with the current amounts respondents report being paid within industry. For the same sample, the threshold hourly pay rate values to work on a non-public holiday Saturday are 135.14 and 121.16 percent of the current reported hourly weekday pay rate depending on whether the Saturday falls during a week during which a public holiday falls. Once more however, the confidence intervals suggest that these values are not statistically different from one another. Similarly a premium value is placed on working on a normal Sunday, irrespective of whether a public holiday occurs during the week or not. Based on the model results, to work on a Sunday, the threshold value of pay is 146.21 percent of the average reported hourly weekday pay rate for the sample if the Sunday does not occur during a week with a public holiday or 126.40 percent if a public holiday falls on another day during the same week. Again, these values are not statistically different from one another.

The study design also allows one to disentangle the threshold value of pay respondents have for working on a public holiday that falls on a weekday. For employees operating under the Restaurant Industry Award 2010, the average threshold value at which respondents would elect to work on a weekday public holiday was found to be 124.35 percent the existing reported average normal hourly weekday pay rate for the sample. This increases to 150.31 percent if the public holiday falls on a Saturday and 155.55 percent if the public holiday occurs on a Sunday.

Similar conclusions can be made for respondents belonging to the General Retail Industry Award 2010. The threshold hourly pay rate to work on a non-public holiday for this segment was found to be 112.22 percent of the average reported hourly pay rate if the day occurs during a normal work week (i.e., a week with no public holidays). Statistically, this value is slightly higher than the

average normal hourly weekday pay rate reported by this segment. For non-public holiday weekdays occurring during a week in which a public holiday falls, this value drops to 105.38 percent of the reported average normal hourly weekday pay rate. Interestingly, this later value is not statistically different to the reported average normal hourly weekday pay rate for the segment, nor statistically different to the 112.22 percent found if the weekday occurs during a normal week.

Examination of the threshold pay rates for weekend work shows a threshold hourly pay rate value to work on a non-public holiday Saturday of 112.22 of the current reported hourly weekday pay rate if the Saturday occurs during a week during which no public holiday falls, or 106.62 percent of the reported hourly weekday pay rate if a public holiday does occur during that same week. Once more however, the confidence intervals suggest that these values are not statistically different from one another. A larger premium is placed on working on a normal Sunday, irrespective of whether a public holiday occurs during the week or not. Based on the model results, to work on a Sunday, the threshold value of pay is 156.93 percent of the average reported hourly weekday pay rate for the sample if the Sunday does not occur during a week with a public holiday or 165.14 percent if a public holiday falls on another day during the same week. However, these values are not statistically different from one another based on the confidence intervals reported.

In terms of working on a public holiday, the average threshold value for employees covered by the General Retail Industry Award 2010 at which they would accept to work was found to be 164.68 percent the existing reported average normal hourly weekday pay rate for the sample, increasing slightly to 165.92 percent if the public holiday falls on a Saturday and to 224.44 percent if the public holiday occurs on a Sunday. Overall, these results suggest that employees covered by the General Retail Industry Award 2010 do not have a premium value for working on a Saturday compared to a Sunday, but do require a premium to work on Sundays, irrespective of whether the day is a public holiday or not.

Although not shown here, the modelling undertaken also examined whether there exists differences in the relative hourly pay thresholds for working a morning or evening shift relative to an afternoon shift, or whether employees paid part time rates (i.e., both part time and full time employees) value work time differently to those paid casual rates. In none of the models were differences found to exist, suggesting the above discussion holds true irrespective of the time of day a shift occurs, or the rate at which an employee is currently paid.

ES.4 Study Conclusions

This document provides a detailed account of a study conducted by I4C on behalf of the ABLA and ABI dealing with identifying the importance and value employees operating under either the Restaurant Industry Award 2010 and the General Retail Industry Award 2010 have for working both normal and/or "unsocial hours". Based on a survey of 443 respondents, multiple approaches are reported allowing for a triangulation of the results. Overall, respondents report current activities undertaken mornings and nights to be more important to them than activities carried out during the afternoon, suggesting less flexibility to work during these times. Further, the results of an unprompted recall task revealed that sampled respondents are more familiar with national public holidays, and hence more likely to value them than they are state based public holidays. This finding was confirmed based on a constant sum task, where Christmas day and New Year's day, followed by Australia day and Boxing day. After accounting for state specific Easter public holidays, respondents did indeed tend to rate state based public holidays as being much less important to them relative to the nationwide public holidays.

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Institute for Choice Key Project Participants

Project Leader: Professor John M. Rose

Professor John Rose is the newly appointed Director: Research at the Institute for Choice and Research Professor at the University of South Australia. Prior to that, he was Professor in Transport and Logistics Modelling, Director of the Choice Analysis Program, and Graduate Studies Program Director at the University of Sydney. He taught transport modelling, transport economics, and discrete choice modelling.

Professor Rose's research interests are discrete choice modelling and efficient stated choice experiments. He is widely published in the top transportation and logistics journals (including Transportation, Transportation Research A, B and E) and is a co-author (with Professors David Hensher and William Greene) of Applied Choice Analysis; A Primer, (2015) 2nd ed., by Cambridge University Press. He is currently writing a book on generating efficient stated choice experimental designs (with Mike Bliemer, University of Sydney) and is Editor-in-Chief of Transportation Research: Part A and the Journal of Choice Modelling. Professor Rose consults to business, working in the areas of transportation evaluation and modelling, demand and take up for pharmaceutical and agricultural products, cost benefit analysis in the telecommunications, industry, and non-market valuation of environmental goods.

Project Manager: Ms Gail Bradford

As Project Manager for a number of the Institute's national and international studies, Gail liaises with external clients and academics to ensure all projects are completed on time, within budget, and to the client's satisfaction.

Gail has over 35 years' experience in the workforce, including 20 in the financial services sector, and during this time she has honed her skills in alliance building, event management, relationship and change management. Gail's breadth of experience allows her to work collaboratively with industry partners, academics and the wider community on a range of both commercial and government funded projects.

Senior Programmer: Mr Jun Zhang

Jun is responsible for developing and implementing new discrete choice methods for research. He has more than 20 years programming experience with a variety of computer language. In recent years, he has focused on the developing of online choice experiment applications and web survey framework.

Jun holds a Bachelor of Honours in Engineering (Geodesy) from Wuhan Technical University of Surveying and Mapping.

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1. Project background

This document outlines a study conducted by the Institute for Choice (I4C), a research institute based at the University of South Australia, which has been prepared on behalf of the Australian Business Lawyers and Advisors (ABLA) and Australian Business Industrial (ABI) as part of a submission to the four yearly review of modern awards currently being conducted by the Fair Work Commission. The study was designed in order to examine both the importance and value employees operating under the Restaurant Industry Award 2010, and the General Retail Industry Award 2010, place on their time. In particular, the study reported herein aims to determine the relative importance and value of work time employees working under the two above named awards have for various times of the day over the course of a potential work week, including for "unsocial hours". Particular emphasis has also been placed on examining the value of time employees have for working during public holidays.

This report seeks to answer several research questions. First, the research seeks to determine what hours and what days are deemed socially more or less important, where importance is defined as an ability or desire to reschedule ones current activity set should a conflicting event, such as a new work shift, arise at that time. Rather than assume that weekends are deemed less desirable days to work, the study allows for an examination of which days and times different employees either prefer to work, or feel more flexible to working during. Understanding the desirability of various times and days to engage in employment activities is important, given changes to societal expectations as to the value of certain activities, alongside changes to when activities take place. For example, one can no longer assume that Sunday is a day for family gatherings and deemed the least desirable day to work, particularly amongst certain segments of society who may prefer to socialise on weekdays or weeknights.

Under the current modern award system, public holidays attract a significant penalty rate. This makes working on a public holiday attractive for employees, but acts as a deterrent for businesses to open given non-trivial labour cost increases experienced. Given this, the second research objective of this study is to identify the level of knowledge employees under the two Awards have regarding what are the specific public holidays they are entitled to during the 2015 calendar year, including both national and state public holidays, and to subsequently determine the relative importance the population of interest has for each of the relevant public holidays. In doing so, the study seeks to determine whether all public holidays are considered equal in the eyes of employees and hence whether more or less emphasis should be put in terms of remunerating employees for working on different public holidays.

A third objective of this study is to determine the hourly pay rate relevant employees are willing to accept an offer to work a shift, either during a normal work week or during a week on which a public holiday falls. In effect, this question asks what value do employees place on their time. Specifically, this question addresses whether employees operating under the two Awards value differently time over the course of a day and over the days of the week, and whether their value of time is consistent with the current award structure.

This document outlines several approaches adopted by the I4C in order to address the above research objectives. Discussed in detail is a survey developed specifically to identify what are the set of work and non-work related activities a sample of 443 employees are currently undertaking during a typical week, how important such activities are valued in terms of their willingness to substitute these activities for work, and what is the value respondents place on their time. Also

discussed is a series of questions designed to determine the level of knowledge sampled employees have in terms of what are the public holidays scheduled for their state, and how important each public holiday is to them.

Discussed herein are details of the survey development process, the results of a pilot study, and the findings associated with a main field phase of this project. Specific details of the sample are provided.

The remainder of this document is set out as follows. Section 2 outlines the specific research objectives of this project. Section 3 provides an overview of the various approaches adopted to address these research objectives of the project. The section provides a detailed discussion of the methodology employed, the questionnaire design, and research process adopted for the study. Results from a pilot study are also presented in Section 3, as well as information on the sample design used for the main field phase of the study. Section 4 provides information about the empirical data collected from the main field phase of the study, before the model results are discussed in Section 5. Concluding comments are provided in Section 6.

2. Project research objectives

As briefly mentioned in Section 1 of this report, this study seeks to address three specific research questions. To summarise, the three project research objectives involve determining 1) how important employees view time over the course of a normal week, and how flexible they are to change their current schedule should a work conflict arise, 2) the knowledge of, and relative importance placed on various public holidays, and 3) the hourly pay rate at which employees are willing to accept offers of work, including during normal working periods and for work during 'unsocial hours', including for working on public holidays. By addressing all three research questions, this study seeks to provide information that may assist the Fair Work Commission in making deliberations about the new award rates for employees currently employed under either the Restaurant Industry Award 2010 or General Retail Industry Award 2010. In particular, the study is designed to provide information not only as to how important different time periods over a week are to employees, but also direct evidence as to the value those employed under the relevant awards place on their time. Each of the project research objectives are summarised below.

2.1: Identify relative importance placed on time

The first research question seeks to determine how important different times of the day are for relevant employees under the two identified awards, where importance is defined in terms of either a willingness or ability to substitute activities occurring at different times of the week for work.

2.2: Identify knowledge and importance of public holidays

The second research question seeks to identify the level of knowledge employees under the two Awards have about public holidays as well as how importantly they rate the various public holidays that occur over the course of a year. In addition to knowledge of the various public holidays, the second research question sets out to determine the relative importance employees place on the public holidays appropriate to the state in which they live and work.

2.3: Identify relative value of time for normal and unsocial working hours

The last research question seeks to determine the hourly pay rate for the sampled population for which they are willing to accept an offer to work a shift, either during a normal work week or during a week on which a public holiday falls.

3. Project approach and methodology

This section sets at the survey approach adopted to address the research questions identified previously. The section begins with a summary of the research activities undertaken, before discussing in detail various sections of a survey developed specifically for this study. Next, the results of a pilot study are discussed, before the sample design is introduced. Finally, a description of the data collected is provided.

3.1: Project process

In order to address the research objectives outlined in Section 2 above, a survey was developed consisting of several sections, each designed to answer a specific research question. After identifying the research questions, an internet based prototype questionnaire was developed by I4C. The questionnaire began with a series of questions designed to capture information related to the activities sampled employees undertook during the week prior to undertaking the survey. These questions were in the form of an activity diary. To complete the diary, respondents were asked to fill out a form detailing what activity took place, the start and finish time of the activity, the location the activity took place and whether other people were also involved in the activity. Also asked was the relative importance of the activity, based on a six point scale, with one suggesting the activity could never be changed, and six indicating that the activity could be very easily changed if necessary.

The second section of the survey involved presenting respondents with a discrete choice experiment (DCE). A DCE represents a method designed to elicit the preferences respondents have for different alternatives of interest. A typical DCE involves showing respondents a series of different hypothetical alternatives, the characteristics of which are systematically varied, and asking which, if any, the respondent either prefers, or would choice in real life. By observing how the choices made by respondents change as the characteristics of the alternatives are altered, it is possible to determine the relative importance each characteristic plays in the decision making processes employed by the sampled respondents. In the current study, the survey presented respondents with four scenarios, each described by seven work shifts. In turn, each work shift was described by various hourly pay rates, the day and time of day the shift was to occur, and the length of the shift. The values that populate the shift characteristics were initially determined randomly, however later versions of the DCE task were based on an underlying experimental design. Given the shifts shown, respondents were asked whether they would accept an offer to work that shift, or not.

The third section of the survey presented respondents with a series of questions to gauge their knowledge of public holidays relevant to the state in which they live and work. This took the form of an unprompted recall task, where respondents were asked to recall as many relevant public holidays as possible, as well as which months they fall. The unprompted recall task was immediately followed by a constant sum task which is a method designed specifically to determine the relative importance respondents place on objects contained within a series. In this

case, the constant sum task involved respondents having to allocate 100 points amongst the public holidays relevant to their state.

The fourth section of the survey involved a second DCE task, similar to the first task, with one exception. As before, the DCE task presented respondents with hypothetical work shifts that they were asked to either accept or reject, with each shift being described by different hourly pay rates, day and time of day, and length of shift. Unlike the first task however, respondents were now told that one or more of shifts fell on a 'named' public holiday. The public holidays shown were drawn from the previous section, where at least one scenario involved the most and least important rated public holiday based on the constant sum task, with the other public holidays selected at random. The final section of the survey collected information on the socio-demographic characteristics of the respondent.

Once the survey was developed, two focus groups consisting of eight respondents each and moderated by Professor Stephen Holden, an independent consultant, were undertaken during the week of 8th April 2015. The focus groups were designed to test the feasibility of the proposed survey as well as to determine respondent reactions to the questionnaire itself. Based on the findings of the two focus groups, a number of relatively minor changes were made to the survey in order to reduce the cognitive burden placed on respondents completing the survey, as well as to fix a number of minor errors such as question wording and spelling.

Respondents for the main field phase were recruited by the marketing research firm Stable Research (http://www.stableresearch.com.au/). Once recruited, respondents were asked to attend a central location near either their workplace or home where a trained interviewer provided by ABLA supervised the completion of the survey. Respondents were recruited from all states and territories with the exception of the Northern Territory. The main field phase for the study commenced on the 20th May 2015 with the final survey collected on the 29th May 2015.

A total of 472 respondents completed the survey in this manner, however after extensive data cleaning, data from a total of 443 respondents was retained for the purposes of this report. Once collected, appropriate data analysis was undertaken by members of I4C in order to address the three main research questions identified previously.

3.2: Questionnaire

Based on the above discussion, the survey can be broken down into several distinct sections. We now discuss each of the survey sections in detail, and in doing so relate how each section addresses a specific identified research question. Although not shown here, the first screen of the questionnaire asked a series of quota related information, such as what state the respondent currently resides within, their current hourly pay rate, and what award they currently are employed under. Also asked were questions about whether the respondent is paid at either a part time (which includes both full time and part time employees) or casual pay rate, and whether the lived in a rural or metropolitan area.

3.2.1 Section 1: Activity diary and importance of time

The first section of the survey involved respondents being asked to complete an activity diary for the week prior to the survey. An activity diary was used as opposed to a proposed schedule where respondents are asked to complete in advance a diary of their planed or scheduled activities as the use of activity diaries has the advantage of ensuring external validity in that the activities

reported can be assumed to be the activities that actually took place. Given that different respondents were sampled over a number of weeks, the process also ensures that any atypical event that occurs during the field phase of the survey does not affect the entire sample. Figure 1 shows a screen capture of the activity form respondents were asked to complete as part of the survey. The form required respondents click on blocks of times throughout the sample period and complete a series of questions related to what took place during that period of time. For each selected block of time, respondents were asked to provide detailed information as to what activity occurred during that period of time, the location of the activity, and with whom the activity took place. To address the first research question, sampled respondents were also asked to indicate how important the activity is to them in terms of whether they could or potentially would be able to forsake or change that activity using a six point rating scale 1 (respondent could never change that activity) to 6 (could very easily reschedule or change the activity).

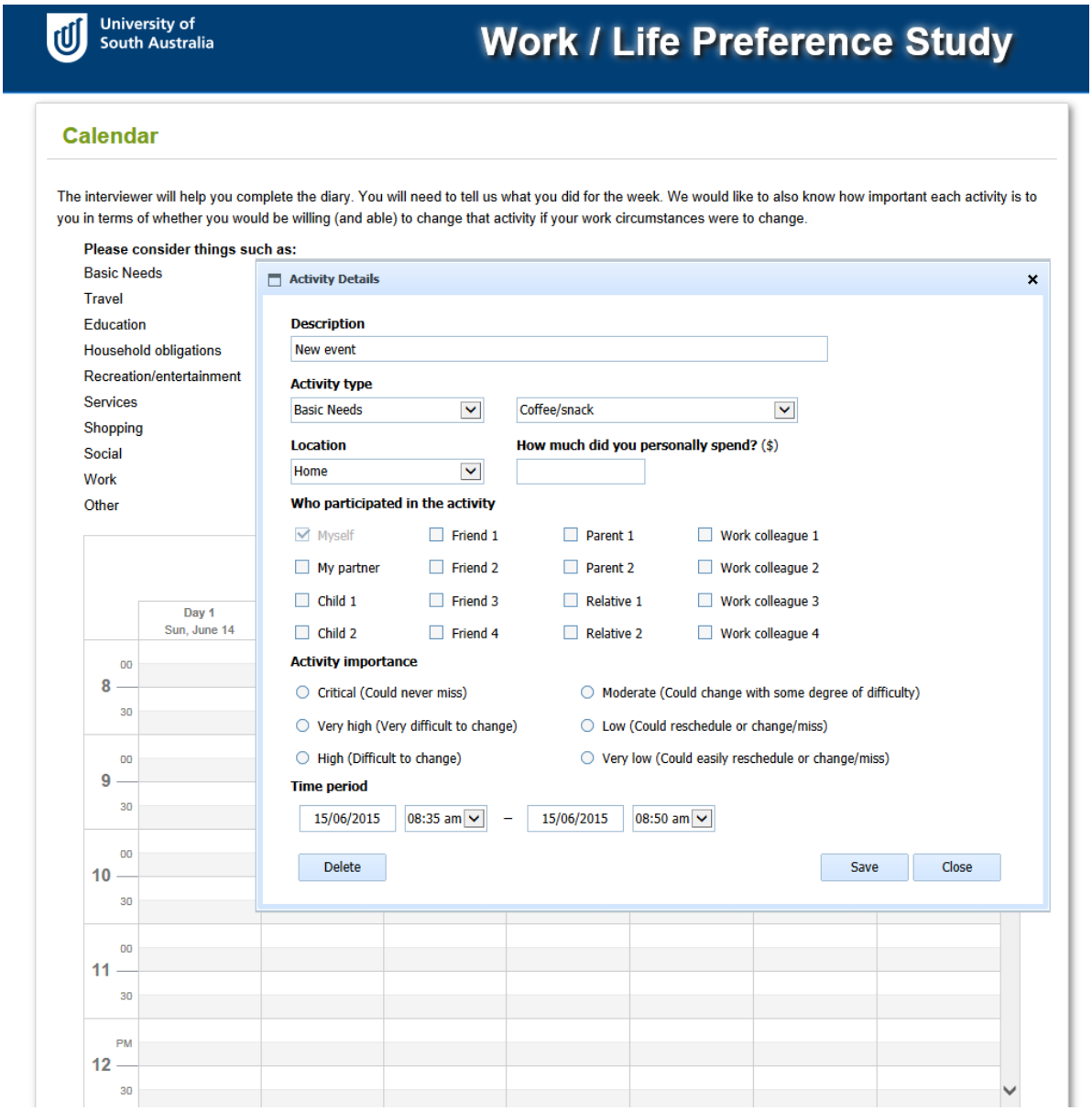

Figure 1: Activity details form (including importance rating task)

Originally, it was intended that respondents be forced to complete the diary for every moment of the week, however as a result of a pilot study (see Section 3.3), respondents were allowed to leave complete the diary to account for what they considered to be the main events that occurred during the previous week. The ability of respondents to omit activities for various times is not seen as a major limitation as failure to provide such information suggests that what occurred at that time was not important enough to report relative to the activities that were recalled.

The activity importance scale can be used to provide an indication as to how important various times of the week are to the sampled population. Average ratings can be used to explore how different times are rated as important by the sample, both in the aggregate and for subsets of the sample population. The results of this task are reported in Section 5.1.

3.2.2 Section 2: DCE #1 Relative value of time for working normal hours

The second section of the survey directly relates to the research question seeking to determine the minimum hourly pay rate employees employed under either the Restaurant Industry Award 2010 or General Retail Industry Award 2010 are willing to accept in order to work during a normal work week. In order to address this research question, respondents were exposed to a discrete choice experiment (DCE). DCEs involve the systematic variation of combinations of attribute levels to reveal new opportunities relative to the existing circumstance of the attribute levels on offer within a market (see e.g., Louviere et al. 2000; Hensher et al. 2015). DCE data enables the investigation of levels of attributes that do not exist in real markets (as well as new modal alternatives; see Figure 2). The alternative to DCE data is revealed preference (RP) data, which represents actual market data. RP data is useful when we stay within the attribute range of attributes associated with each alternative and that we can be confident that the levels of non-chosen alternatives re reliable (even when they are perceived levels which are the key drivers of choice).

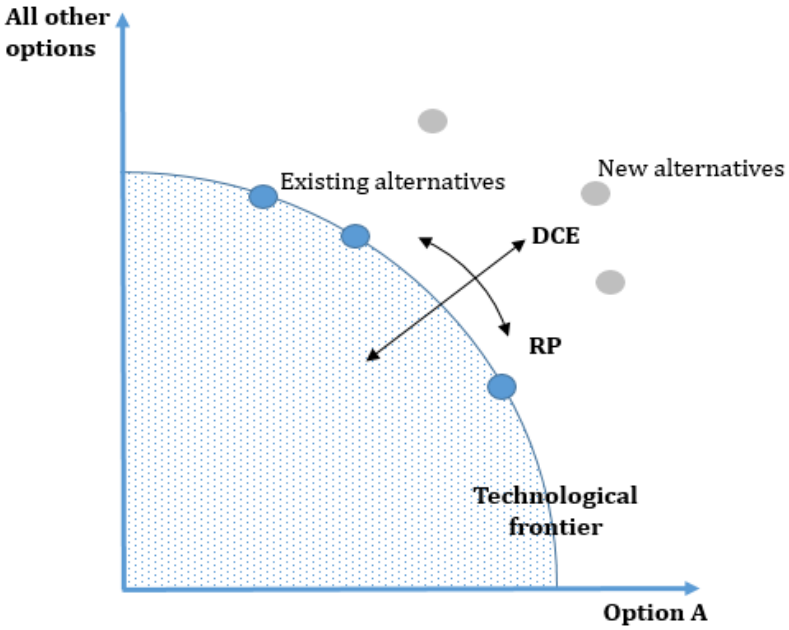

Figure 2: Attribute space of Revealed Preference and Discrete choice Experiment data

In the current context, it is not possible to make use of RP data as the industrial relations system of Awards involves a framework in which pay rates are largely fixed, although employers may

offer above award rates. This means that there exists very little variation in hourly pay rates for existing employees operating under the Award system, particularly for pay rates lower than the current Awards systems allow (which is currently illegal in Australia).

DCEs require that the researcher construct a set of hypothetical scenarios involving two or more alternatives, at least one of which is described by a set of attributes and attribute levels (i.e., in the case of a binary choice task where one alternative is a no choice represented without attribute levels, it is necessary to construct the levels for only one of the two alternatives). Respondents completing the survey are then asked to review these scenarios and indicate their preferences for the alternatives based on the attributes and attribute levels shown. Typical DCEs involve showing respondent's more than one choice scenario, where the levels of the attributes used to describe the object being evaluate are systematically varied (i.e., the various work shifts) in order to determine the relative importance each of the attributes has on the decision making process of the sampled respondents. By systematically varying each attribute over the scenarios, it is possible to determine how respondents' trade-off each of the attributes with one another (e.g., are respondents willing to accept a lower hourly rate for more hours or to work on a Wednesday morning).

Through the experimental design paradigm we are able to observe a sample of workers making choices between bundles of work shift described by hourly pay rates that are both higher and lower than outlined under the current Award system. This approach is the most powerful method capable of separating out the independent contributions of each attribute component between a number of options for a specific segments, represented under the two Awards covered by the current project. Whilst other stated preference methods exist, such as contingent valuation (CV), the use of DCE data remains the preferred approach time (e.g., the Copyright Tribunal, in relation to proceedings pursuant to section 157B of the Copyright Act 1967, examined alternative methods to value music in fitness centres, including DCEs and CV. As part of the proceedings, the Tribunal ruled that DCEs were the most appropriate method to use in valuing typically non-traded goods. See Phonographic Performance Company of Australia Limited 2010), capable of providing disaggregated estimates of marginal rates of substitution, such as the value of.

For the present study, the DCE involved respondents being shown four hypothetical scenarios, each described by seven potential work shifts. Each work shift was further described by the day and date of the shift, the block of time the shift was to be worked, the duration of the shift, and the rate of pay per hour to work the shift. Over the four scenarios, the number of shifts offered was fixed at seven, however the day and date of the shift, the block of time the shift was to be worked, the duration of the shift, and the rate of pay per hour to work the shift, were for the main field phase, varied according to an underlying experimental design. For the pilot study, the values shown in each scenario were randomly allocated across respondents. Respondents were told as part of the experiment that each of the shifts represented times required by the boss to be filled, and that accepting to complete a shift that conflicted with existing work schedules would mean that the current working shift would no longer filled by the respondent. Respondents were then asked to accept or reject each new work shift as offered. An example of a choice scenario is shown in Figure 3. Appendix A provides screen captures of an example survey, including four choice scenarios showing an example of how the attribute levels in the current study were varied over the four scenarios.

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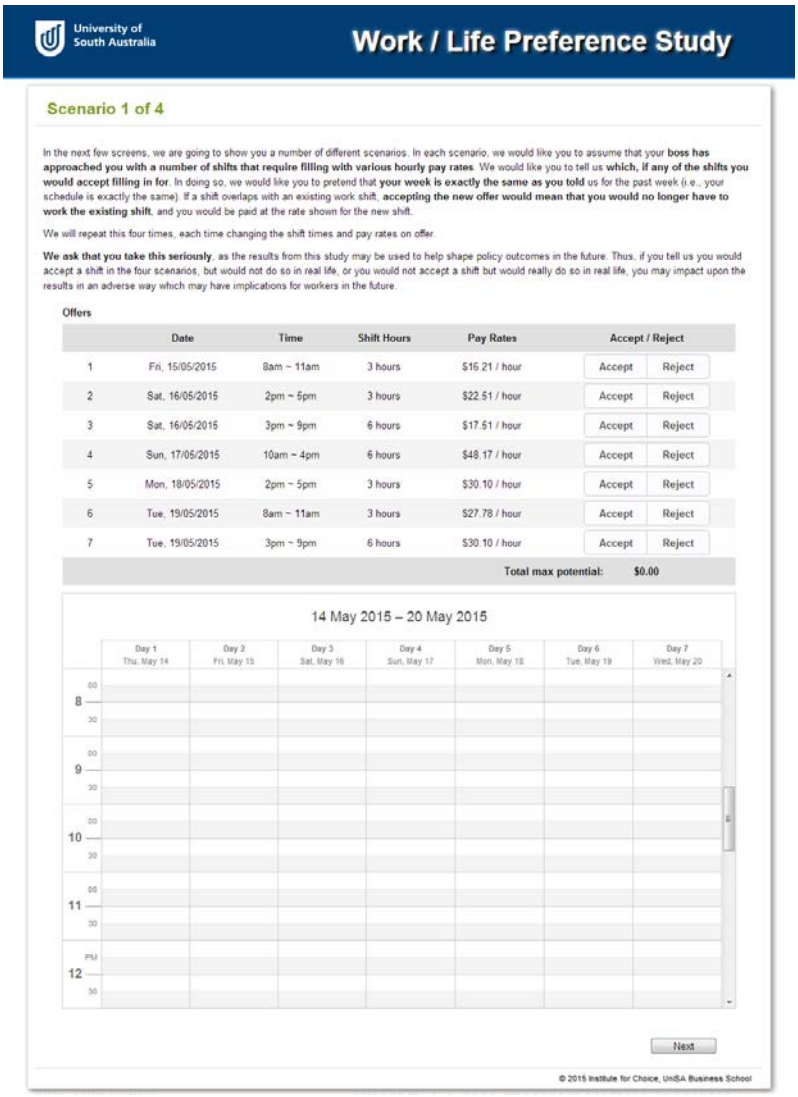


Figure 3: Example discrete choice task

Given that respondents are asked to choose from amongst a set of hypothetical alternatives as part of the survey process, it is necessary for the analyst to assign the levels describing the attributes prior to writing the survey. This is most often accomplished using an experimental design. Conceptually, an experimental design is simply a matrix of values that is used to determine what goes where in a SC survey. These values may be either numbers or labels depending on how the analyst wishes to relate the information of the experiment to the respondents. The values that populate the matrix represent the attribute levels that will be used in the SC survey, whereas the columns and rows of the matrix represent the choice tasks (alternatively called choice sets or choice situations depending on the literature cited), attributes (sometimes referred to as factors) and alternatives (referred to as profiles in the marketing literature and treatment combinations in the mainstream experimental design literature) of the experiment.

The experimental design employed for the main field phase was a D-efficient design generated under the assumption of an MNL model with non-zero Bayesian priors. The priors used assumed uniform distributions for the pay rate and shift time so that only the a priori sign of the attributes were assumed in generating the design (see Rose and Bliemer 2014, 2015 for a review of the

experimental design literature). It was expected that additional work hours would have a negative utility, whilst higher pay rates would have a positive utility (this was confirmed in the pilot study (see Section 3.3), For the remaining attributes, a balanced incomplete block design (BIBD) was used as a master availability design to ensure that day and shift time appeared an equal number of times over the course of the experiment. For time periods were assumed which when combined with the seven days of the week, resulted in 28 different possible combinations of day/time of day outcomes. The resulting BIBD required 36 choice scenarios, and hence the final experimental design also had 36 choice scenarios (see Rose et al. 2013).

Four different experimental designs were constructed based on the master design, one for each of the two award (Restaurant and Hospitality Industry) and current hourly pay rate (i.e., casual/full time and part time). The four separate designs were required due to current differences in the pay rates for each of the four segments. The experimental designs pivoted the attribute levels of the design around the current Award rates so that scenarios would cover situations in which the pay offers were both greater and less than the current pay rate. The attribute level variations used in the experiment are shown in Table 1. The times of the shifts also varied, however these were changed depending on the place of employment of the respondent. For example, coffee shops generally operate between the hours of 6am till 3pm in NSW, whilst retail shops may be open from 8am till 9pm in the same state.

Table 1: Pay rate attribute levels

	Restaurant Industry Award 2010							
	Full Time/Part time rates				Casual rates			
Level	**Mon. - Fri.**	**Sat.**	**Sun.**	**Public holiday rate**	**Mon. - Fri.**	**Sat.**	**Sun.**	**Public holiday rate**
1	$12.61	$15.76	$18.92	$31.54	$15.76	$18.92	$18.92	$31.54
2	$14.42	$18.02	$21.62	$36.04	$18.02	$21.62	$21.62	$36.04
3	$16.22	$20.27	$24.33	$40.55	$20.27	$24.33	$24.33	$40.55
4	$18.02	$22.52	$27.03	$45.05	$22.52	$27.03	$27.03	$45.05
5	$19.82	$24.77	$29.73	$49.56	$24.77	$29.73	$29.73	$49.56
6	$21.62	$27.02	$32.44	$54.06	$27.02	$32.44	$32.44	$54.06
7	$23.43	$29.28	$35.14	$58.57	$29.28	$35.14	$35.14	$58.57
	General Retail Industry Award 2010							
	Full Time/Part time rates				Casual rates			
Level	**Mon. - Fri.**	**Sat.**	**Sun.**	**Public holiday rate**	**Mon. - Fri.**	**Sat.**	**Sun.**	**Public holiday rate**
1	$16.21	$17.51	$25.94	$32.42	$16.21	$17.51	$25.94	$35.66
2	$18.52	$20.01	$29.64	$37.05	$18.52	$20.01	$29.64	$40.75
3	$20.84	$22.51	$33.35	$41.68	$20.84	$22.51	$33.35	$45.85
4	$23.15	$25.01	$37.05	$46.31	$23.15	$25.01	$37.05	$50.94
5	$25.47	$27.51	$40.76	$50.94	$25.47	$27.51	$40.76	$56.03
6	$27.78	$30.01	$44.46	$55.57	$27.78	$30.01	$44.46	$61.13
7	$30.10	$32.51	$48.17	$60.20	$30.10	$32.51	$48.17	$66.22

In each DCE task, the activity diary completed by the respondent was shown below each choice scenario to act as a reminder of what activity the respondent indicated they were doing during that time. The inclusion of the activity diary in this manner acts to frame the decision context of the choice task within some existing memory schema of the individual respondents, and hence make preference-revelation more meaningful at the level of the individual. Theoretically, the role of reference alternatives in DCE tasks is well supported within the literature. For example, prospect theory (Kahneman and Tversky 1979), which argues that individuals use decision heuristics when making choices, promotes the idea that the very specific context in which a decision is made by each individual is an important determinant of the selection of choice-heuristic, supporting the use of reference alternatives in DCE tasks. Framing effects, of which reference dependence is a popular interpretation, provides context support in trading off the

desire to make a good choice against the cognitive effort involved in processing the additional information provided in a SC task (Hensher 2010). Case-based decision theory (Gilboa et al. 2002) promotes the role of accumulated experience represented by a reference alternative. Starmer (2000, p353) in particular argues strongly for the use of reference alternatives in decision theory:

"While some economists might be tempted to think that questions about how reference points [alternatives] are determined sound more like psychological than economic issues, recent research is showing that understanding the role of reference points[alternatives] may be an important step in explaining real economic behaviour in the field."

In this way, the adopted approach represents best practice for the use of DCEs in practice.

3.2.3 Section 3: Knowledge and relative importance of public holiday

The third section of the survey presented respondents with a set of question specifically designed to test their knowledge of the relevant public holidays for their state, as well as determine the relative importance each public holiday holds for the sample. As such, Section 3 of the survey seeks to directly address the second research question of this study. To address this question, an unprompted recall task was devised where respondents are asked to name as many as possible, the public holidays that occur in their state (see Figure 4). The use of an unprompted recall task ensures that respondents are not able to recall a public holiday that they otherwise would have forgotten as can occur with a prompted recall task.

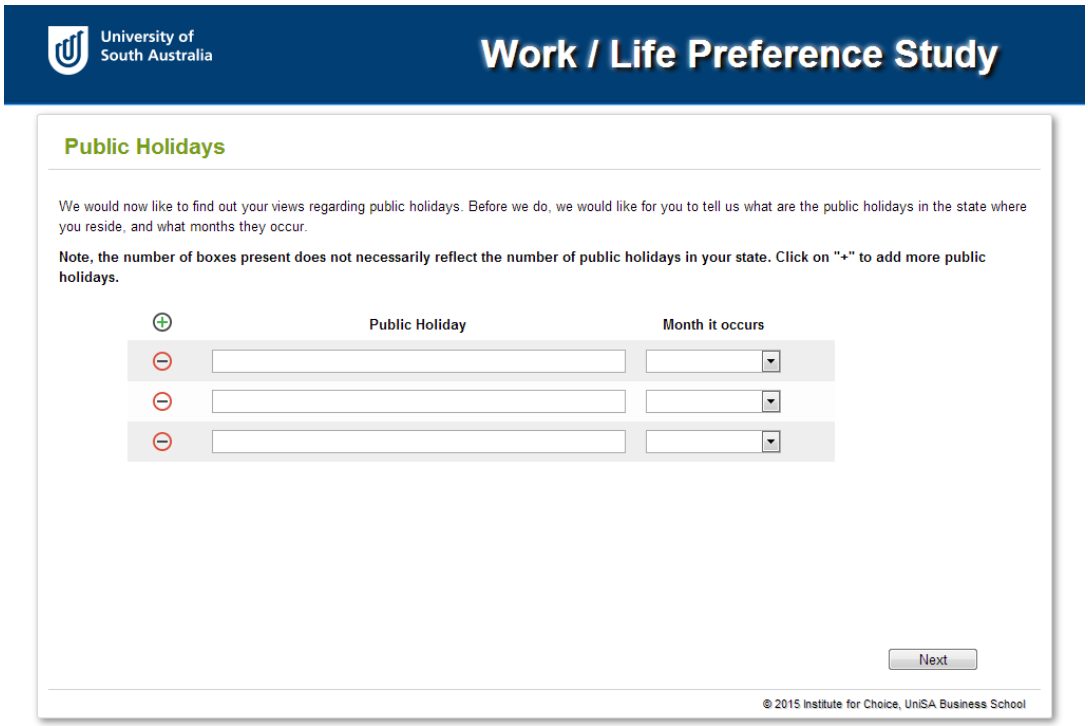
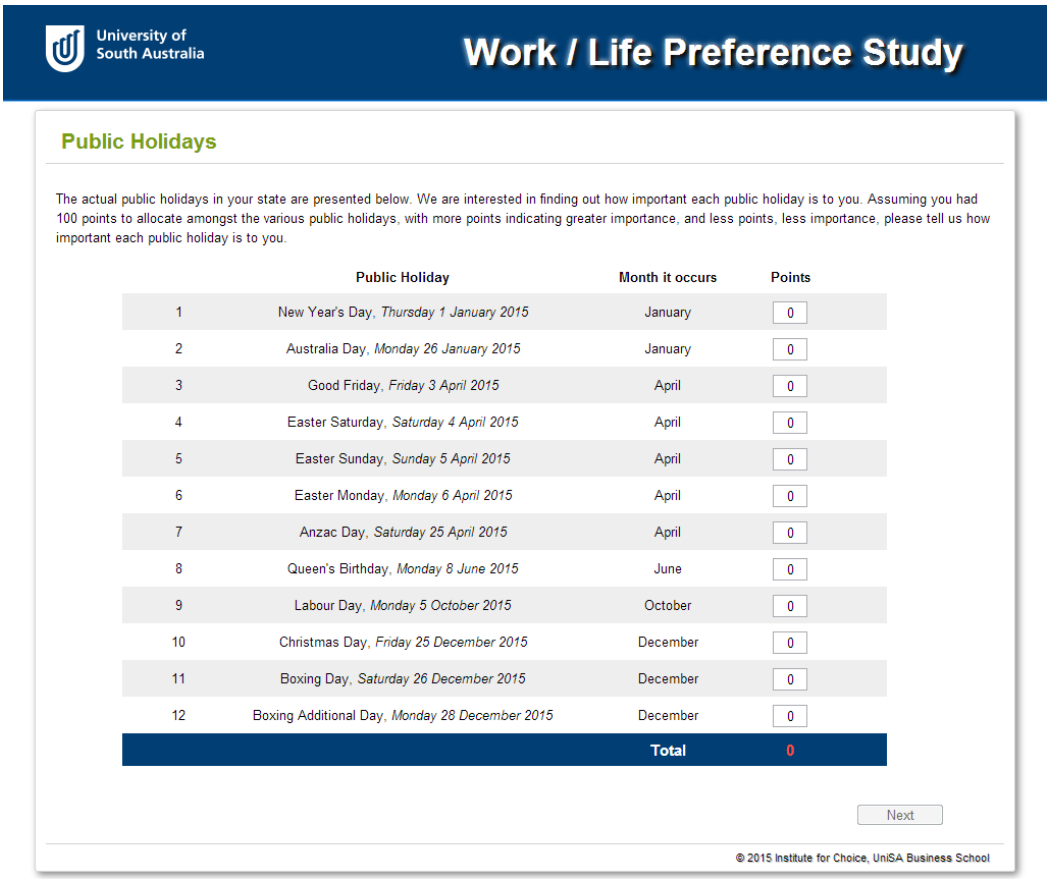


Figure 4: Unprompted recall public holiday task

Immediately following the unprompted recall task, respondents were presented with the actual public holidays as they exist for their state, and asked to complete a constant sum task. The constant sum technique requires that respondents allocate a fixed number of points between a set of options to indicate relative importance or relative preference for each of the options shown

(Brace 2013). A constant sum task was used for the present study, as some states have up to 13 public holidays, which may prove too many for some respondents to be able to effectively rank, and we wish to avoid the possibility of respondents simply giving each public holiday an equal rating, as often occurs when using ratings tasks (Beck and Rose 2014). Figure 5 presents an example of the constant sum task respondents were asked to complete.



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Work / Life Preference Study

Public Holidays

The actual public holidays in your state are presented below. We are interested in finding out how important each public holiday is to you. Assuming you had 100 points to allocate amongst the various public holidays, with more points indicating greater importance, and less points, less importance, please tell us how important each public holiday is to you.

	Public Holiday	Month it occurs	Points
1	New Year's Day, *Thursday 1 January 2015*	January	0
2	Australia Day, *Monday 26 January 2015*	January	0
3	Good Friday, *Friday 3 April 2015*	April	0
4	Easter Saturday, *Saturday 4 April 2015*	April	0
5	Easter Sunday, *Sunday 5 April 2015*	April	0
6	Easter Monday, *Monday 6 April 2015*	April	0
7	Anzac Day, *Saturday 25 April 2015*	April	0
8	Queen's Birthday, *Monday 8 June 2015*	June	0
9	Labour Day, *Monday 5 October 2015*	October	0
10	Christmas Day, *Friday 25 December 2015*	December	0
11	Boxing Day, *Saturday 26 December 2015*	December	0
12	Boxing Additional Day, *Monday 28 December 2015*	December	0
		Total	0

Next

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Figure 5: Public holiday constant sum task

3.2.4 Section 4: DCE #2 Relative value of time for unsocial working hours

The forth section of the survey involved respondents having to complete a second DCE task similar to that used to that employed to address the second research question (i.e., what are the preferences for remuneration of the sampled population to work during various times over a normal work week) was used to answer the fourth research question. As before, respondents were presented with seven shifts that require filling by their boss, and asked which of the shifts they would be willing to accept. As per the previous DCE task, each shift was described by the day of the shift, the block of time the shift was to be worked, the duration of the shift, and the rate of pay per hour to work the shift. Unlike the first DCE task however, respondents were told that one or more of the shifts offered falls on a named public holiday. Dates were removed from the scenario, although the month the public holiday falls was mentioned in the task. An example choice task is given in Figure 6.

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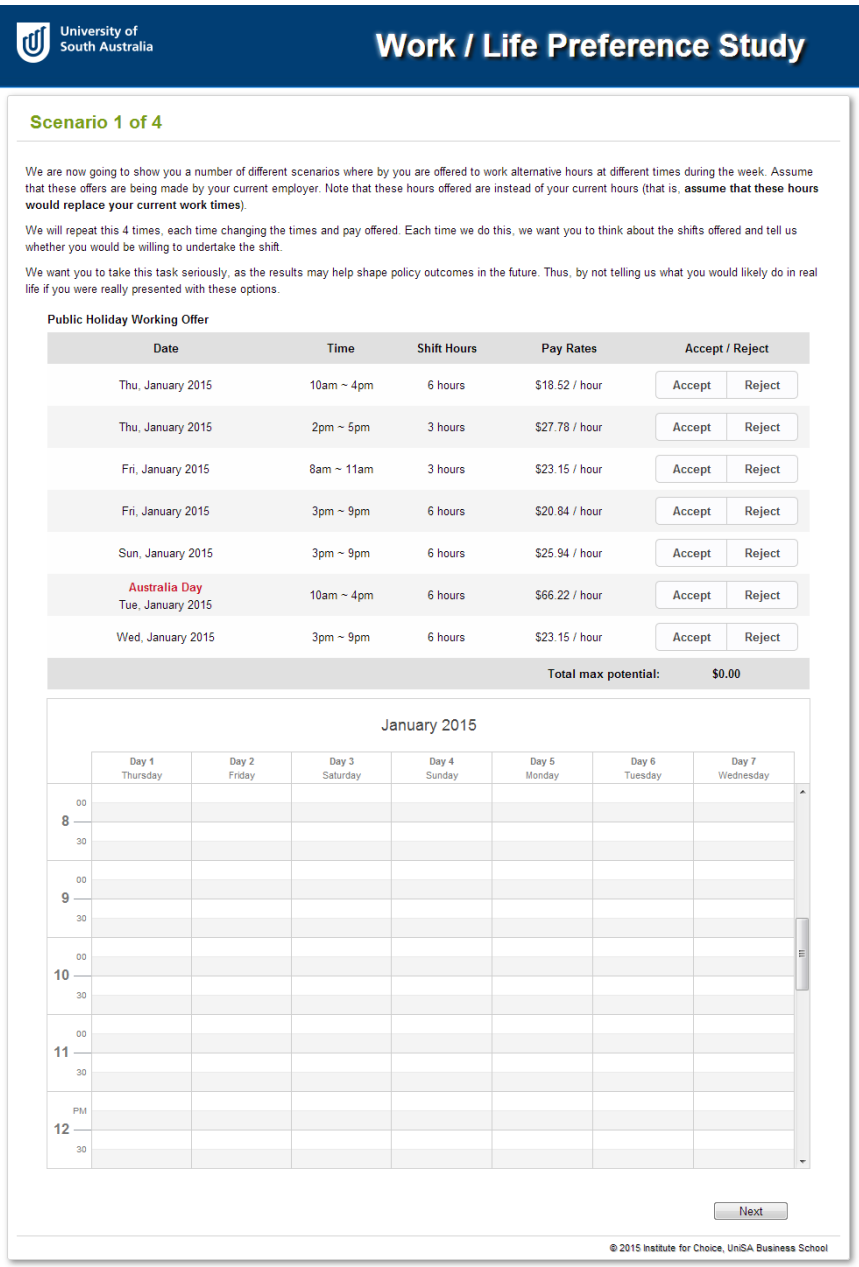

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Work / Life Preference Study

Scenario 1 of 4

We are now going to show you a number of different scenarios where by you are offered to work alternative hours at different times during the week. Assume that these offers are being made by your current employer. Note that these hours offered are instead of your current hours (that is, **assume that these hours would replace your current work times**).

We will repeat this 4 times, each time changing the times and pay offered. Each time we do this, we want you to think about the shifts offered and tell us whether you would be willing to undertake the shift.

We want you to take this task seriously, as the results may help shape policy outcomes in the future. Thus, by not telling us what you would likely do in real life if you were really presented with these options.

Public Holiday Working Offer

Date	Time	Shift Hours	Pay Rates	Accept / Reject	
Thu, January 2015	10am ~ 4pm	6 hours	$18.52 / hour	Accept	Reject
Thu, January 2015	2pm ~ 5pm	3 hours	$27.78 / hour	Accept	Reject
Fri, January 2015	8am ~ 11am	3 hours	$23.15 / hour	Accept	Reject
Fri, January 2015	3pm ~ 9pm	6 hours	$20.84 / hour	Accept	Reject
Sun, January 2015	3pm ~ 9pm	6 hours	$25.94 / hour	Accept	Reject
Australia Day Tue, January 2015	10am ~ 4pm	6 hours	$66.22 / hour	Accept	Reject
Wed, January 2015	3pm ~ 9pm	6 hours	$23.15 / hour	Accept	Reject
			Total max potential:	**$0.00**	

January 2015

Day 1 Thursday | Day 2 Friday | Day 3 Saturday | Day 4 Sunday | Day 5 Monday | Day 6 Tuesday | Day 7 Wednesday

8 00 30 | 9 00 30 | 10 00 30 | 11 00 30 | 12 PM 30

Next

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Figure 6: Example discrete choice task with public holiday

The task was made as realistic as possible in terms of presenting public holidays that fall on particular days of the week as actually falling on that day (e.g., Good Friday occurs only on a Friday of the week), and public holidays that fall on consecutive days were presented as such in the choice tasks respondents saw (e.g., Boxing day was shown to occur after Christmas day if the appropriate consecutive days appeared in the scenario shown. That is, if both a Thursday and Friday appeared in the diary, and Christmas was assigned to Thursday, Boxing Day was assigned to the Friday. If however Christmas was assigned to Friday, and the following day was not covered in the week long period of the task, Boxing Day was not shown within the task). Examples of various scenarios showing public holidays are presented in Appendix A.

Rather than simply offer scenarios solely related to work on a public holiday, the scenarios also presented respondents with offers of work on non-public holiday days for that same week. This was done as it was hypothesised that the sampled population may make different trade-offs in terms of work during a week in which a public holiday falls, relative to a normal work week. That is, a worker may choose to not work on a non-public holiday day during a week when a public holiday falls, if the hourly pay offered to work on a public holiday breaches some threshold. Likewise, workers may choose to work more shifts on non-public holiday working days during a week when a public holiday falls, rather than work on the public holiday itself. By including offers of work shifts for both public holiday and non-public holidays as part of the scenarios, it is possible to test both types of reactions.

Respondents completed four scenarios involving the presence of a public holiday. Rather than randomly or systematically assign public holidays to respondents, the public holidays shown were linked to the constant sum task respondents completed previously in the survey. In at least one of the tasks, the public holiday allocated the highest number of points in the constant sum task was displayed, as too a public holiday given the least number of points (or no points). The remaining two scenarios were randomly drawn from the list of possible public holidays from the respondent's home state. By using the public holidays reported by each respondent as being their most and least important holiday, the values respondents place on their time and their preferences for remuneration to work on a public holiday, or during a week in which a public holiday falls, covers the range of possible values for the population of interest.

3.2.5 Section 5: Socio-demographics

The final section of the survey involved asking respondents several socio-demographic questions describing themselves. Included were questions about the respondent's age, gender, annual before tax income level, as well as how many hours the respondent works in a typical week. Also asked were a series of questions about the composition of the household in which the respondent resides, including how many children and adults live within the household and how many cars are owned by members of the household. Finally, questions about the type of household were asked. The specific questions adopted, and the categories employed are the same as those used by the Australian Bureau of Statistics for the Census. A screen capture of the socio-demographic questions asked is presented in Figure 7 overleaf.

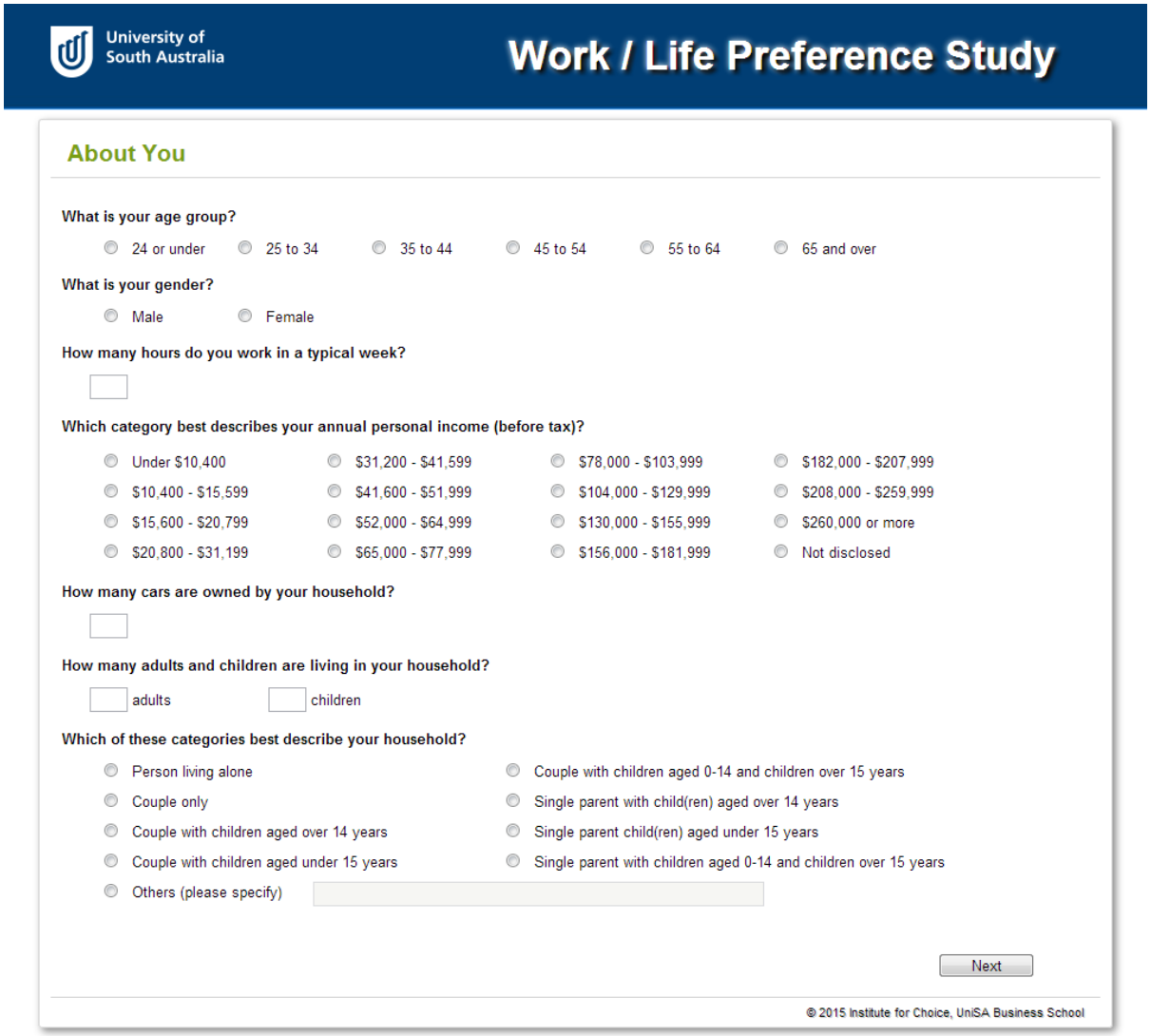
Example screenshots of the entire survey can be found in Appendix A.

3.3: Pilot study results

Two focus groups were undertaken during the week of 8th April 2015 for the purpose of testing the feasibility of the proposed methodology as well as to investigate respondent reactions to the questionnaire. The focus groups were conducted by Professor Stephen Holden in the premises of the Sydney Research Facility in Clarence Street, Sydney NSW. During the focus groups, participants were asked to complete a mock-up of the survey which was shown to them via laptop computers.

The two focus groups constituted a total sample of 16 respondents, eight per each group. Despite screening procedures being in place, two participants were not eligible for receiving penalty rates and hence, should not have been included in the focus groups. Of the remaining 14 respondents, nine worked in retail, and five in restaurants/bars. Eight participants were female. The average number of hours worked per week was 24.64, ranging from a minimum of 12 and a maximum of

50 hours per week. The most common age group of the respondents was between 20-29 years of age.



University of South Australia

Work / Life Preference Study

About You

What is your age group?

24 or under | 25 to 34 | 35 to 44 | 45 to 54 | 55 to 64 | 65 and over

What is your gender?

Male | Female

How many hours do you work in a typical week?

Which category best describes your annual personal income (before tax)?

Under $10,400	$31,200 - $41,599	$78,000 - $103,999	$182,000 - $207,999
$10,400 - $15,599	$41,600 - $51,999	$104,000 - $129,999	$208,000 - $259,999
$15,600 - $20,799	$52,000 - $64,999	$130,000 - $155,999	$260,000 or more
$20,800 - $31,199	$65,000 - $77,999	$156,000 - $181,999	Not disclosed

How many cars are owned by your household?

How many adults and children are living in your household?

adults | children

Which of these categories best describe your household?

Person living alone	Couple with children aged 0-14 and children over 15 years
Couple only	Single parent with child(ren) aged over 14 years
Couple with children aged over 14 years	Single parent child(ren) aged under 15 years
Couple with children aged under 15 years	Single parent with children aged 0-14 and children over 15 years
Others (please specify)	

Next

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Figure 7: Survey socio-demographic questions

During the focus groups, respondents were asked to complete a working version of the survey. The pilot survey involved random allocation continuing (i.e., there was no formal experimental design used)of attribute levels related to what days the shifts were offered, the time of day and duration of the shift, the hourly rate offered and any overtime hourly rate, and the whether the offer was for the week in question only, or. Further, the levels used for the pilot survey to inform the hourly award rates were not indicative of actual real life values, which were subsequently been provided by ABI post pilot study. Despite these limitations, data from the sample was used to estimate preliminary models, however these models are excluded from this report.

The focus group participants made a number of recommendations to improve the survey, a number of which were implemented prior to moving to the main field survey. Firstly, several spelling errors in the survey were corrected. The main concern regarding the survey arose from the first focus group in which the diary required the entire week long diary be completed with no

spaces. This resulted in respondents having difficulty in completing the task. This requirement was relaxed prior to the second focus group commencing and resulted in a significant improvement in the respondents' ability to complete the task as asked. We note however that respondents left significant blanks in the diary once they did not have to complete all times. The moderator, Professor Holden recommended changing the survey so that recruited respondents could complete the diary nightly prior to attending the survey centre during the main field phase. This recommendation was not adopted given the researchers experience with similar diary surveys which result in significant drop-outs. Rather, the recruited respondents for the main field phase were informed that they will be required to complete a diary and told that to make notes of their schedule during the week. Respondents were then asked to bring their notes with them to the survey. Further, it is the researcher's view that the issue of respondents leaving blanks in the activity survey indicate that such times obviously do not stand out in the respondents mind and hence are not important enough for them to report relative to the times they did recall. Nevertheless, as recommended by the focus group moderator, the types of were added above the survey task to serve as a reminder of what types of activities respondents might have undertaken during the week. Further refinements to the activity types, and clarifications around questions about costs related to work were made, as recommended by Professor Holden.

Professor Holden also noted some respondents struggled with the wording of importance when asked about how important various activities are to them. To counter this, the concept of what we mean by important – that is, times that the respondent feels they would not be able to change under any circumstances, was strengthened within the survey task. Finally, Professor Holden raised issues with regards to the ability of respondents to allocate 100 points amongst the various public holidays. The use of rankings was considered however as some states have up to 13 public holidays, it was felt that such a ranking may prove even more difficult for respondents. Similarly, Likert scales were considered however experience has shown that respondents typically rate each object as being equally important, the 100 allocation task was retained for the main field phase.

Of critical importance however, was the fact that respondents were able to complete the two stated choice experiments without any difficulty. Indeed, the only questions raised related to the pay rates offered in the various scenarios, as opposed to questions about what was expected of respondents completing the tasks. The pay offers for the main field phase were related to the actual current award rates, and hence, we feel that any concerns raised by respondents about the pay rates shown during the pilot study have been ameliorated.

3.4: Survey sample design

Whilst the theory of sampling, as related to discrete choice models, is well developed for RP data (see Louviere et al. 2000), until recently, little was known about sample size requirements for DCE data. Experience suggests however that theory is often discarded in any case for more practical considerations such as issues related to budget and time. Hensher et al. (2015) report that in the experience of many, the minimum sample size requirement for discrete choice experiments is 50 respondents per alternative modelled. Given that each respondent in DCEs undertake multiple choices over a variety of choice sets, each sampled respondent in reality provides multiple data observations. For example, assuming an experiment with three alternatives, a total of 150 respondents should be sampled from the population. Assuming each respondent is given 12 choice sets, the total number of observations for the study will be 1,800.

More recently however, Bliemer and Rose (2013) have developed specific theory to calculate precise sample size requirements for SC experiments. This sample size theory relates to generating DCEs that will produce robust estimates for models estimated using data collected in small samples. Although the theory and resultant methods can be applied to large populations, the sample size calculations used become less important. As such, given the scale of the proposed study, it is suggested that a combination of sampling theories be applied. Firstly, it is suggested that more traditional sampling approaches be used for purposes of segmentation, and that the methods developed by Bliemer and Rose (2013) be applied within each segment. This will ensure not only robust estimates for forecasting, but the ability to generalise the results to the wider population. Specifically, we propose segmenting the market along geographical lines combined with a choice based sampling approach.

For the current study, we use a quota based sampling. The use of quota based sampling allows for robust parameter estimates across all segments given that respondents of all types are represented in the data. Whilst random sampling is often preferred to quota sampling, if one wishes to estimate models allowing for say respondents currently employed under casual contracts, and such respondents are relatively rare within the population, then no such model can be estimated, or where such a model is capable of being estimated, the parameter estimates will not be robust, and hence the resulting model outputs less useful. The collection of quota based samples not only allows for the estimation of robust parameter estimates, but if required, the data can be re-weighted to match external data on known population distributions. As such, quota based sampling represents the best sampling method for the current study proposal.

The original proposal called for sample size of 500 respondents to be collected, spread across the states and territories of Australia, and that further quotas and be placed on respondents living with areas designated as either metro or rural. Given that the Award system is a Federal system, such quotas ensure that respondents from a wide range of areas across Australia are represented by the sample. Whilst it is also possible to place quotas on employment and Award type, it should be noted that greater costs accrue to placing more quotas on recruitment of respondents due to search costs. It was felt that sufficient coverage of respondents of various employment and award types would arise naturally, whereas the location of respondents would purely arise as a result of the recruitment process. Hence, it was decided that quotas would be placed only on where respondents currently live and work. Table 2 presents the quota segments for the study.

Table 2: Quotas by segment

	Metro	Rural	Total
ACT	35	15	50
NSW	50	20	70
NT	35	15	50
QLD	50	20	70
SA	50	20	70
TAS	35	15	50
VIC	50	20	70
WA	50	20	70
Total	**355**	**145**	**500**

4. Description of empirical data

A total of 472 respondents completed the survey, however after extensive data cleaning was conducted to ensure that only representative and plausible responses were included (e.g., some

respondents were removed from the analysis after reporting earning over $50 an hour), valid data from 443 respondents was available for modelling purposes. Given that each respondent answered four scenarios each for the two DCEs, this represents 1,772 observations per experiment available for modelling. Table 3 presents the final sample sizes obtained by segment based on these 443 respondents. Shown in brackets are the percentage of respondents relative to the desired cell quota. As can be seen from Table 3, no respondents were obtained from the Northern Territory despite concerted efforts from both Stable Research and ABLA. General difficulty was also experienced in recruiting respondents from rural areas other than NSW. Given this, rural workers were over sampled in NSW so that sufficient sample of such workers were present within the final data. Overall the number of respondents from NSW exceeded the quota, whilst those from metropolitan areas in Western Australia were also over sampled. All other quota cells were not meet.

Table 3: Quotas achieved by segment

State	Metro	Rural	Total
ACT	17 (48.57)	3 (20.00)	20 (40.00)
NSW	85 (170.00)	54 (270.00)	139 (198.57)
NT	0 (0.00)	0 (0.00)	0 (0.00)
QLD	65 (130.00)	0 (0.00)	65 (92.86)
SA	40 (80.00)	9 (45.00)	49 (70.00)
TAS	28 (80.00)	6 (45.00)	34 (68.00)
VIC	57 (114.00)	1 (5.00)	58 (82.86)
WA	73 (146.00)	5 (25.00)	78 (111.43)
Total	**365** (102.82)	**78** (53.79)	**443** (88.60)

Failure to meet the quotas need not be a concern in terms of current study. It was never intended that separate models be estimated on each cell quota type. Rather, it was always intended to estimate models based on the two award types, with tests conducted to determine whether differences exist between the different quota cells. Indeed, of more importance to the current study is the breakdown of the sample into the two award types as well as in terms of casual versus full time/part time employment. This information is presented in Table 4. Respondents reported as belonging to the retail segment operate under the General Retail Industry Award 2010, whilst the remaining three groups, those working in restaurants, cafes, or coffee shops work under the Restaurant Industry Award 2010. As such, 58.01 percent of the final sample belong to the retail segment, with the remaining 41.99 percent belonging to the Restaurant Industry Award 2010. Of the 443 sampled respondents, 66.37 percent reported being casually employed, with the remaining 33.63 percent being either full time or part time employed as defined under the award system.

Table 4: Sample breakdown by occupation class and employment type

	Casual	Full Time/Part time	Total
Retail	150	107	**257**
Restaurant	17	5	**22**
Café	41	10	**51**
Coffee shop	86	27	**113**
Total	**294**	**149**	**443**

Descriptive statistics for the sample are presented in Table 5. As before, the majority of the sample are from the state of New South Wales, with the next most frequent state being represented by Western Australia. Of these. 83.39 percent of respondents reside or work in a metropolitan area. As is to be expected, the vast majority of the sample are young with 365 or 44.24 percent being

under the age of 24, and a further 161 or 36.34 percent reporting being between 25 and 34 years of age. No respondent reported being over the age of 65. The vast majority of respondents were female representing 295 or 66.59 percent of the total sample. Finally, the annual income levels of respondents tended towards the lower before tax income level categories. Indeed, almost 60 percent (59.37 percent) reporting an annual income level of $31,199 or less, and almost 80 percent (77.43 percent) an annual income level before tax of $41,599 or less.

Table 5: Sample socio-demographic characteristics

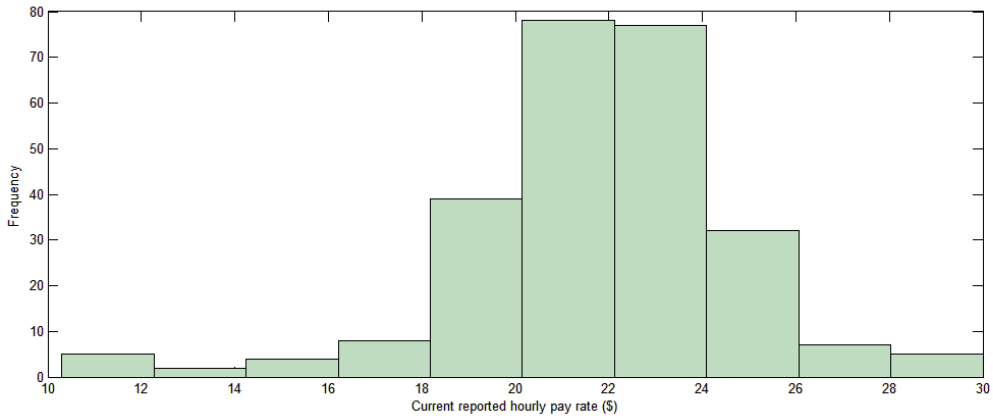
State	Frequency	Percentage
ACT	20	4.51%
NSW	139	31.38%
NT	0	0.00%
QLD	65	14.67%
SA	49	11.06%
TAS	34	7.67%
VIC	58	13.09%
WA	78	17.61%
Metro/Rural	**Frequency**	**Percentage**
Metro	365	82.39%
Rural	78	17.61%
Age	**Frequency**	**Percentage**
24 or under	196	44.24%
25 to 34	161	36.34%
35 to 44	66	14.90%
45 to 54	19	4.29%
55 to 64	1	0.23%
65 and over	0	0.00%
Gender	**Frequency**	**Percentage**
Male	148	33.41%
Female	295	66.59%
Income	**Frequency**	**Percentage.**
Under $10,400	40	9.03%
$10,400 - $15,599	64	14.45%
$15,600 - $20,799	53	11.96%
$20,800 - $31,199	106	23.93%
$31,200 - $41,599	80	18.06%
$41,600 - $51,999	49	11.06%
$52,000 - $64,999	21	4.74%
$65,000 - $77,999	16	3.61%
$78,000 - $103,999	5	1.13%
$104,000 - $129,999	1	0.23%
$130,000 - $155,999	0	0.00%
$156,000 - $181,999	1	0.23%
$182,000 - $207,999	0	0.00%
$208,000 - $259,999	0	0.00%
$260,000 or more	1	0.23%
Not disclosed	6	1.35%

As part of the survey, respondents were also asked to report their current hourly pay rate for a normal working week. Table 6 presents the average reported values by award type over a range of socio-demographic segments. Overall, the average reported per hourly rate currently being paid for those under General Retail Industry Award 2010 is $21.92 whilst the average hourly rate

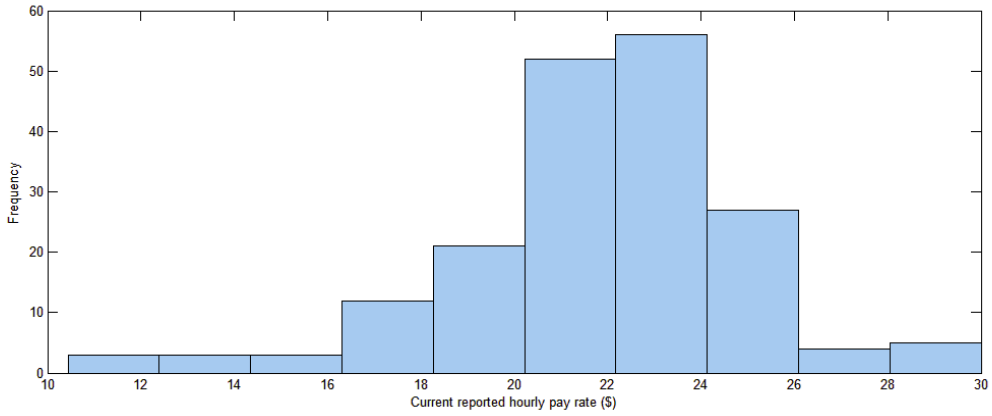
for those working under the Restaurant Industry Award 2010 is $21.95. Figure 8 shows histograms representing the distributions of reported hourly pay rates for the two award types.

Table 6: Sample breakdown by occupation class and employment type

Segment	General Retail Industry Award 2010	Restaurant Industry Award 2010	*t*-test of differences
Overall	***$21.92***	***$21.95***	***0.114***
ACT	$20.40 (0.000)	$18.05 (0.009)	
NSW	$21.99 (0.132)	$21.25 (0.364)	
QLD	$21.46 (0.014)	$22.63 (0.449)	
S.A.	$22.25 (0.989)	$22.50 (0.341)	
Tasmania	$21.32 (1.000)	$21.42 (0.495)	
Victoria	$22.37 (0.921)	$22.30 (0.939)	
W.A.	$22.22 (0.005)	$22.73 (0.134)	
Restaurant	-	$21.97 (0.977)	
Café	-	$21.42 (0.166)	
Coffee shop	-	$22.19 (0.118)	
Full time/Part time	$21.32 (0.005)	$21.57 (0.081)	
Casual	$22.35 (0.005)	$22.07 (0.081)	
Rural	$21.21 (0.000)	$20.61 (0.001)	
Male	$21.74 (0.152)	$22.61 (0.247)	
Female	$22.00 (0.152)	$21.59 (0.247)	



(a) **General Retail Industry Award 2010**



(b) **Restaurant Industry Award 2010**

Figure 8: Distribution of reported hourly pay rates

An independent samples *t*-test was performed to test whether there are statistical differences between the hourly reported rates for these two groups. The results of this *t*-test suggest that the two award groups are not statistically different from each other on average. Also shown in the table are the average reported hourly pay rates for the sample by differing socio-demographic segment. In brackets are *p*-values showing whether the reported values for a given segment differ to those of not belonging to that segment (*p*-values lower than 0.05 are statistically significantly different than at a five percent level, whilst *p*-values lower than 0.1 are statistically significantly different than at a ten percent level). Overall, employees from the ACT report a statistically significant lower hourly pay rates than non-ACT workers at a five percent level for both award groups. No other state based differences were found for those employed under the Restaurant Industry Award 2010. Queensland employees under the General Retail Industry Award 2010 were found to report a statistically significant lower average of hourly pay relative to non-Queenslanders, whilst those employed in Western Australia have a statistically significant higher reported average hourly pay rate.

For the Restaurant Industry Award 2010, no statistical differences were found in terms of reported pay rates for those working in Restaurants, Cafes, or Coffee shops. For both award types, casuals report higher hourly pay rates on average than full time/part time employees, consistent with the current award arrangements. For both award types, those working in rural areas were found to have a lower reported hourly pay rate on average relative to those working in metropolitan areas. No statistical differences were found between male and female reported hourly pay rates.

A data dictionary for the entire data set collected is provided in Appendix B.

5. Study findings

Presented in this section of the document are the results of the survey described in Section 3. All results are estimated using the sample data discussed in Section 4. The results outlined are presented in line with the survey questions first identified in Section 2 of this report. Where necessary, the specific methods applied to obtain the results reported are also discussed in detail.

5.1: Identifying the relative importance placed on time

As part of the survey, respondents were asked to complete a diary of their activities for the week prior to when they undertook the survey. As a result of recommendations made during the pilot study focus groups, respondents were not required to provide details for each block of time during the week. As such, respondents were only required to complete questions on the activities they could recall to have occurred, or deemed important enough to relay. For each activity recorded, respondents were asked to indicate how important the activity undertaken was to them using a six point scale, where importance was defined as an ability or desire to change that activity should a conflicting event, such as a work shift, arise at the time of the activity. The scale used was such that one represented an activity for which the respondent could not or would not change under any circumstance and six represented an activity that they would very easily reschedule or be willing to change should an unexpected scheduling conflict occur.

Table 7 presents the average reported importance value for the sample by day and time of day. For the sample, the average importance rating was 2.821 suggesting that respondents mostly view their time as being somewhat difficult to change, or would be somewhat unwilling to change

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their activities should an unexpected event arise. Very little variation exists between days of the week, with average ratings ranging from 2.721 for Tuesdays to 2.907 for Fridays. More variation exists within each day, with an average importance rating of 2.660 for the hours between 6am and midday, increasing to 2.878 between the hours of 1pm and 5pm, with a further increase to 3.213 between the hours of 6pm and midnight, before dropping to 2.569 for the hours between midnight and 6am. This suggests that on average, the sampled population place more importance on their time prior to midday, and after midnight compared to other hours of the day, with the least important time being between 5pm and midnight.

Table 7: Reported time importance by day and time of day

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Average
6AM	**2.270**	2.413	2.351	**2.387**	2.727	**2.352**	2.464	**2.423**
7AM	2.276	**2.256**	**2.312**	2.565	2.809	2.582	**2.403**	2.458
8AM	2.514	2.454	2.457	2.565	2.864	2.773	2.618	2.606
9AM	2.643	2.651	2.660	2.566	2.843	2.754	2.639	2.679
10AM	2.765	2.776	2.840	2.651	2.948	2.868	2.756	2.801
11AM	2.749	2.82	2.917	2.675	2.911	2.877	2.836	2.826
12PM	2.781	2.792	2.834	2.704	2.927	2.89	2.875	2.829
1PM	2.841	2.752	2.793	2.718	2.925	2.952	2.896	2.840
2PM	2.796	2.732	2.864	2.693	2.929	2.984	2.900	2.843
3PM	2.787	2.746	2.773	2.743	2.863	3.009	2.956	2.840
4PM	2.926	3.005	2.911	2.757	2.887	2.976	3.083	2.935
5PM	3.048	2.917	2.910	2.770	2.876	2.952	3.068	2.934
6PM	3.236	2.916	3.021	2.910	3.171	3.192	3.121	3.081
7PM	3.316	3.150	3.247	2.913	3.356	3.280	3.275	3.220
8PM	3.453	3.204	3.412	3.047	**3.421**	**3.386**	3.444	3.338
9PM	**3.464**	**3.327**	**3.535**	**3.138**	3.379	3.372	**3.603**	**3.403**
10PM	3.355	3.180	3.411	3.012	3.127	3.045	3.574	3.243
11PM	3.069	2.969	3.250	2.684	2.898	2.824	3.266	2.994
12AM	2.653	2.670	2.647	2.812	2.644	2.627	2.618	2.667
1AM	2.640	2.532	2.673	2.670	2.721	2.576	2.564	2.625
2AM	2.552	2.594	2.554	2.697	2.747	2.649	2.581	2.625
3AM	2.521	2.539	2.452	2.585	2.682	2.574	2.500	2.550
4AM	2.551	2.449	2.42	2.497	**2.553**	2.468	2.412	2.479
5AM	2.588	2.395	2.325	2.545	2.568	2.406	2.454	2.469
Average:	2.825	2.760	2.815	2.721	2.907	2.849	2.871	2.821

With the exception of Fridays, the most important time, represented by the lowest average rating for the day highlighted grey in Table 7), is either 6am to 7am or 7am to 8am. For Fridays the most important time of day for respondents is 4am to 5am. The least important time (shaded blue in the table), is between 9pm and 10pm for Monday through Thursday, and 8pm to 9pm Friday and Saturday. For Sunday, 9pm and 10pm represents the least important time of the day.

Tables 8 and 9 show the average reported importance of time values broken down across a range of socio-demographic segments, including age groups, employment categories and award types. As with Table 7, cells shaded grey reflect the most important times or days, whilst cells shaded blue reflect the least important times or day. Unfortunately, due to limited sample sizes in each of the various cells, it is not possible to perform meaningful statistical tests on this data. Further, the limited number of respondents aged 45 or older who belong to the Restaurant Industry Award 2010 is so small, that values are not reported in either table for this segment.

Based on the above, a few discernible patterns can be observed within the data. For example, ignoring type, the least important time for respondents occurs between 5pm and 12pm independent of any other socio-demographic type. A similar pattern holds for those employed under the Restaurant Industry Award 2010. The most important times for sampled respondents overall mostly occur between 12pm and 6am, although full time/part time workers and those aged 35 to 44 report 6am to 12pm as being more important to them. In terms of the importance

attached to specific days of the week, Thursday appears to represent the most important day for the sample ignoring industry type, with the exception of those being those aged 35 to 44 who on average report Sunday as being their most important day of the week. As shown in Table 9, the least important day of the week varies without pattern across the various data segments.

Overall, those employed under the General Retail Industry Award 2010 tend to report lower time importance across all parts of the day compared to those employed under the Restaurant Industry Award 2010 (i.e., 2.931 compared to 2.704), however any differences observed are not statistically significant, with the greatest differences being for Fridays (i.e., 3.075 compared to 2.777) and for the hours between 6pm and midnight (2.935 compared to 2.233). The largest age based differences in reported importance of time exists between those aged between 25 and 34, and respondents aged 45 to 54. Overall, the older respondents value their time less than the younger respondents (3.251 compared to 2.715), and hence report being more flexible in terms of their ability to reschedule their activities during the week. Large differences exist for all days except Tuesdays between the two groups, particularly for Fridays and Sundays (3.567 compared to 2.795 and 3.696 compared to 2.797 respectively). Little differences are observed for the hours between 1pm and 5pm for the two groups, however large differences exist for all other time periods, particularly after 5pm (3.745 to 2.91).

Table 8: Reported time importance by time of day and socio-demographic segment

	Entire Sample						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
6AM to 12PM	2.660	2.648	2.683	2.756	2.570	2.496	2.660
12PM to 5PM	2.878	2.877	2.882	2.973	2.840	2.695	2.878
5PM to 12PM	3.213	3.209	3.225	3.304	3.204	2.884	3.213
12PM to 6AM	2.569	2.386	2.877	2.653	2.291	2.268	2.569
Average	2.821	2.771	2.908	2.913	2.715	2.577	2.821
	General Retail Industry Award 2010						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
6AM to 12PM	2.709	2.713	2.706	2.866	2.565	2.587	2.888
12PM to 5PM	2.890	2.865	2.926	2.951	2.928	2.567	2.823
5PM to 12PM	3.241	3.235	3.254	3.304	3.227	2.888	3.617
12PM to 6AM	2.961	2.851	3.162	3.382	2.058	3.687	3.781
Average	2.943	2.910	3.003	3.122	2.680	2.914	3.280
	Restaurant Industry Award 2010						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
6AM to 12PM	2.756	2.582	2.616	2.650	2.609	2.434	-
12PM to 5PM	2.973	2.894	2.764	3.003	2.702	2.822	-
5PM to 12PM	3.304	3.174	3.153	3.292	3.131	2.899	-
12PM to 6AM	2.653	1.980	2.622	2.149	2.631	1.977	-
Average	2.913	2.644	2.783	2.759	2.764	2.517	-

To assist in the analysis of the time importance ratings, an Excel based decision support system (DSS) has been generated as part of the project. A screen capture of the DSS is provided in Figure 9. The DSS allows the user to explore more in-depth the time importance ratings by providing options to interrogate how different segments respondent to the question. The DSS also provides a greater coverage of times, providing average importance ratings for each day broken down into 15 minute blocks. Unlike the results presented here, two sets of importance scores are presented in the DSS for each time period shown. This is due to the fact that respondents were not required to fully complete the activity diary, thus allowing for omission of detail related to certain time periods during the week. Given that the importance task was linked to the activity diary, times for when no activities were provided also mean that importance ratings for these times are missing also. The first column in for each day reports the average importance score ignoring non-

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response. The second column reports the average importance rating for that time period setting non-response to the least important level (i.e., 6). The later approach assumes that the activity that occurred at that time but was not reported, was not important enough to report relative to the activities that were recalled, and hence is given a rating corresponding to the least important activities.

Table 9: Reported time importance by day and socio-demographic segment

	Entire Sample						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
Monday	2.825	2.681	3.030	2.944	2.739	2.595	2.825
Tuesday	2.760	2.729	2.843	2.834	2.770	2.512	2.760
Wednesday	2.815	2.758	2.912	2.857	2.719	2.639	2.815
Thursday	2.721	2.656	2.829	2.747	2.577	2.712	2.721
Friday	2.907	2.892	2.945	3.022	2.795	2.581	2.907
Saturday	2.849	2.848	2.855	3.046	2.610	2.550	2.849
Sunday	2.871	2.830	2.945	2.937	2.797	2.453	2.871
Average	2.821	2.771	2.908	2.913	2.715	2.577	2.821
	General Retail Industry Award 2010						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
Monday	2.912	2.846	3.016	2.996	2.879	2.503	3.169
Tuesday	2.903	2.861	2.982	3.100	2.687	2.904	2.854
Wednesday	2.928	2.902	2.963	2.995	2.654	3.228	3.479
Thursday	2.800	2.699	2.924	2.877	2.539	3.110	3.177
Friday	3.075	3.060	3.142	3.277	2.672	3.071	3.626
Saturday	2.948	3.002	2.914	3.316	2.513	2.735	3.278
Sunday	3.034	3.000	3.078	3.295	2.813	2.782	3.376
Average	2.943	2.910	3.003	3.122	2.680	2.914	3.280
	Restaurant Industry Award 2010						
	Entire Sample	Casual	Full time/Part time	24 years or less	25 to 34	35 to 44	45 to 54
Monday	2.944	2.488	2.986	2.877	2.476	2.713	-
Tuesday	2.834	2.631	2.605	2.591	2.899	2.452	-
Wednesday	2.857	2.611	2.863	2.710	2.907	2.447	-
Thursday	2.747	2.633	2.749	2.710	2.675	2.645	-
Friday	3.022	2.765	2.777	2.893	2.882	2.463	-
Saturday	3.046	2.709	2.803	2.844	2.787	2.448	-
Sunday	2.937	2.674	2.695	2.686	2.724	2.452	-
Average	2.913	2.644	2.783	2.759	2.764	2.517	-

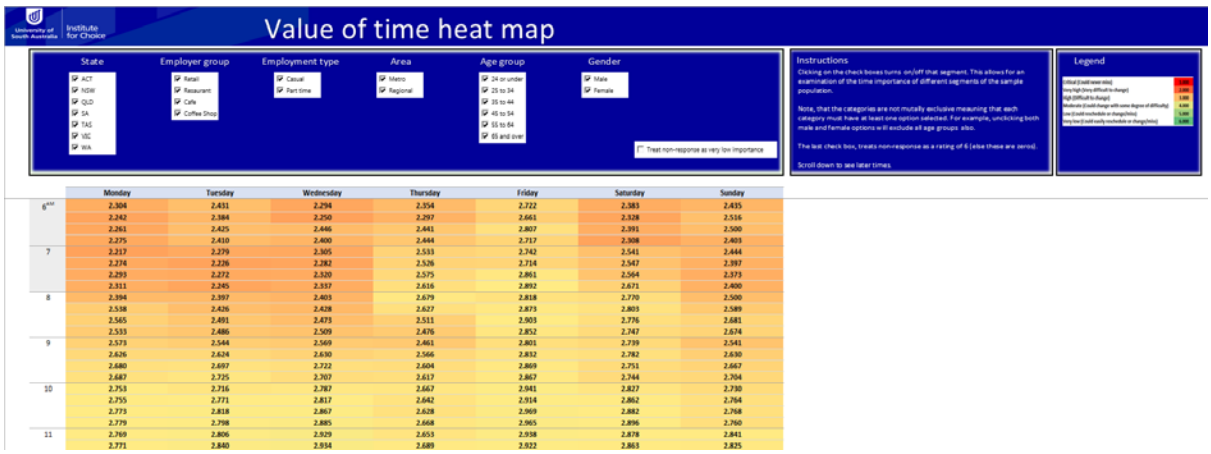

Figure 9: Screen capture of the value of time heat map DSS

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5.2: Determining knowledge and importance of public holidays

The first part of the second research question addressed seeks to determine how knowledgeable sampled respondents are with the public holidays held in Australia. The second part of the second research question is to subsequently determine what relative importance the sample places on each of the public holidays. To answer these two questions, respondents were first presented with an unprompted recall task where they were asked to name the public holidays associated with their state of residence. Next respondents were presented with the actual public holidays, and asked to undertake a constant sum task involving allocating 100 points across the public holidays as a way to indicate the relative importance of each public holiday.

Table 10 reports the results of the unprompted recall task. The 443 respondents were able to collectively nominate 2,609 public holidays. Easter was the most commonly recalled holiday, with mention of at least one public holiday that falls during the Easter break occurring 481 times. Of these 481 mentions, Easter Saturday was mentioned specifically 36 times, Good Friday 146 times and Easter Monday 98 times. The remaining mentions of Easter referred to Easter in a generic sense rather than referring to a specific public holiday. The next most commonly mentioned public holiday was Christmas Day with 295 references, followed by ANZAC day and Australia day. Surprisingly, the Queen's birthday holiday was recalled more often that News Year's day. The Melbourne cup was mentioned by 48.28 percent of respondents from Victoria, with the remaining state based public holidays receiving much fewer mentions. Interestingly, a number of respondents nominated events that do not correspond to public holidays (such as mother's day, although father's day did not rate a mention), with one respondent even reporting that their birthday should be a public holiday.

Table 10: Descriptive statistics of public holiday unprompted recall task

Public holiday	Count	% of total respondents	% of relevant respondents
Adelaide cup	12	2.71%	24.49%
Anzac Day	273	61.63%	61.63%
Australia Day	241	54.40%	54.40%
Christmas	-	-	-
Christmas day	295	66.59%	66.59%
Boxing day	180	40.63%	40.63%
Easter*	481	108.58%	108.58%
Easter Saturday	36	8.13%	10.88%
Good Friday	146	32.96%	32.96%
Easter Monday	98	22.12%	22.12%
Hobart show/cup	5	1.13%	14.71%
Labour day	128	28.89%	31.30%
Melbourne cup	28	6.32%	48.28%
New years	202	45.60%	45.60%
New year's day	167	37.70%	37.70%
New year's eve	14	3.16%	3.16%
Queen's birthday	239	53.95%	53.95%
Other public holiday	64	14.45%	14.45%
Total (valid responses)	**2,609**		

* This exceeds the total sample size, as respondents could nominate more than one public holiday associated with Easter (for example, Good Friday, Easter Sunday).

The results of the constant sum task is presented in Table 11. Shown are the average values assigned by respondents by state to the actual holidays. Care should be taken in comparing the results across the various states given that 1) each state has a different set of public holidays, and

2) the number of public holidays varies across states meaning that the allocation of the 100 points should not be directly compared with one another. With this caveat, the most highly rated public holiday for all states was Christmas day. Other public holidays that rate as being more important on average are News Year's Eve, Boxing day, ANZAC day and Australia Day, with the exception of the later public holiday for workers from the ACT. Typically Good Friday was rated on average as being more important than Easter Monday. The State based public holidays tended to be rated much lower than Australia wide public holidays.

Table 11: Averages of public holiday prompted 100 point allocation task

	ACT	NSW	QLD	SA	TAS	VIC	WA
Adelaide Cup	-	-	-	1.98	-	-	-
Anzac Day	8.20	8.33	4.75	7.22	10.29	8.97	3.65
Australia Day	4.40	8.46	10.71	9.96	11.65	8.19	11.06
Boxing Additional Day	-	4.69	3.12	-	-	2.07	4.14
Boxing Day	10.30	8.91	9.52	7.92	10.53	8.74	10.04
Canberra Day	4.60	-	-	-	-	-	-
Christmas Day	31.25	21.86	35.92	22.63	30.41	23.76	24.38
Christmas Eve	-	-	-	7.29	-	-	-
Easter Monday	7.65	4.85	4.18	4.71	5.03	3.31	6.24
Easter Saturday	6.30	4.56	3.46	4.86	-	3.57	-
Easter Sunday	-	7.82	-	-	-	6.41	-
Eight Hours Day	-	-	-	-	1.65	-	-
Family and Community Day	1.85	-	-	-	-	-	-
Good Friday	10.50	7.41	4.92	8.63	9.29	5.98	7.13
Labour Day*	1.75	2.94	2.71	1.92	-	2.84	3.49
Melbourne Cup	-	-	-	-	-	4.12	-
New Year's Day	9.20	16.60	16.28	11.39	14.94	20.00	15.79
Queen's Birthday	4.00	3.58	1.91	2.31	1.65	2.03	3.10
Recreation Day	-	-	-	-	1.71	-	-
Royal Hobart Regatta	-	-	-	-	1.38	-	-
Royal Hobart Show	-	-	-	-	1.47	-	-
Royal Queensland Show	-	-	2.51	-	-	-	-
Western Australia Day	-	-	-	-	-	-	3.44

* Labour day is held in March in Victoria and Western Australia, and October in ACT, NSW, Queensland and South Australia.

5.3: Determining the relative value of time for normal and unsocial working hours

This section reports the findings related to the last research question, that being, what is the relative value of time employees place on working normal and unsocial working hours. The results of this section are derived from the two DCEs respondents were asked to complete. Before presenting the results in detail, given the uniqueness of the choice task, it is first necessary to describe the econometric models applied to the data. Given the complexity of the material presented in Section 5.3.1 and sub-sections, the reader interested only in the results from this analysis is advised to skip directly to Section 5.3.2.

5.3.1 Econometric modelling

This section outlines the econometric modelling used to analyse the DCE data collected for the current study. Most applications involving the analysis of discrete choice data state as their behavioural inspiration random utility theory (RUT) (see e.g., Train 2009). In an economics sense, RUT posits that respondents are utility maximises, that is, they select alternatives that reflect

their own preferences and which result in the greatest amount of benefit to themselves. Unfortunately, the analyst is unable to observe directly the amount of utility a decision maker has for objects under study and as such, it is necessary to assume some form of error term when modelling the choices observed within some data (see McFadden 1974 and Manksi 1977).

The data for the current project is unique in that for each DCE task, respondents observed seven alternatives representing separate work shifts, each of which they could elect to accept or reject. In typical choice experiments, respondents are asked to select their most preferred alternative out of the set shown, not indicate acceptance or otherwise of each unique alternative. Conceptually, each work shift represents an independent choice that a respondent may either accept or reject, however it is conceivable that the choice to accept or reject a work shift is not independent of the other work shifts shown. This arises from the fact that a respondent may elect to accept a work offer in the presence of the other offers, and hence may act strategically by selecting to accept shifts that either maximise their total weekly remuneration amount whilst minimising the number of hours worked. In this sense, preferences for the alternative work shifts within each scenario may be correlated. Several modelling approaches are possible to account for such correlated preferences. To model the data, we adapt a bivariate binary Probit model specification to account for the multivariate choices associated with the possibly interdependent choices respondents were asked to make. The approach adopted involves the simultaneous estimation of seven binary Probit models in such a manner that the overall system of model equations directly captures the degree of correlation between the independent binary choice tasks within the error terms of the models.

For a given choice situation, the analyst will need data on either the attributes describing the alternatives faced by a decision maker, covariates representing the characteristics of the decision maker, and/or the context in which the decision is being made. Also required are the observed choice outcomes. These data are then used to form utility specifications which are used to explain the observed choice outcomes. The analyst however will never observe the actual utility that the decision maker holds towards each of the alternatives as utility is a latent construct known only (even if subconsciously) to the decision maker.

To formally understand how discrete choice models are derived, let U_{nsj} denote the utility of alternative *j* perceived by respondent *n* in choice situation *s*. U_{nsj} may be partitioned into two separate components, an observed component of indirect utility, V_{nsj} and a residual unobserved component, ε_{nsj}. This error arises due to the fact that rarely, if ever, will the analyst observe all of the variables that lead to each decision maker's level of utility for each of the alternatives *j*. In part, this might be the result of the analyst failing to ask for all relevant information from each decision maker, or that the decision makers themselves cannot relate fully the relevant information to the analyst. As such, it is highly unlikely that U_{nsj} will equal V_{nsj}. To reconcile these two utility constructs, an additional term is required. This additional term, ε_{nsj}, is given Equation (1) below where U_{nsj} equals $V_{nsj} + \varepsilon_{nsj}$, such that ε_{nsj} captures the factors that affect utility but are not measured within V_{nsj}.

$$U_{nsj} = V_{nsj} + \varepsilon_{nsj}. \qquad (1)$$

It is necessary for the analyst to make a number of assumptions about the unobserved components of utility. The most common assumption is that for each alternative, *j*, ε_{nsj}, will be randomly distributed with some density, $f\left(\varepsilon_{ns}\right)$, over decision makers, *n*, choice situations, *s*. Further assumptions about the specific density specification adopted for the unobserved effects, ε_{nsj} (e.g., the unobserved effects are drawn from a multivariate Normal distribution) are also required, with different assumptions leading to alternate econometric models.

Assuming there exists some joint density such that $\varepsilon_{ns} = \left\langle \varepsilon_{ns1}, \ldots, \varepsilon_{nsJ} \right\rangle$ represents a vector of the *j* unobserved effects with density $f\left(\varepsilon_{ns}\right)$, it then becomes possible to make probabilistic statements about the choices made by the sampled decision makers. Specifically, the probability that decision maker *n* in choice situation *s* will select alternative *j* is given as

$$\begin{aligned} P_{nsj} &= \mathrm{P\,rob}\left(U_{nsj} > U_{nsi}, \forall j \neq i\right) \\ &= \mathrm{P\,rob}\left(V_{nsj} + \varepsilon_{nsj} > V_{nsi} + \varepsilon_{nsi}, \forall j \neq i\right) \end{aligned} \tag{2}$$

which is sometimes written as

$$P_{nsj} = \mathrm{P\,rob}\left(\varepsilon_{nsi} - \varepsilon_{nsj} > V_{nsj} - V_{nsi} +, \forall j \neq i\right). \tag{3}$$

Equation (3) reflects the probability that the random term $\varepsilon_{nsi} - \varepsilon_{nsj}$ will be less than the differences in the observed components of utility, $V_{nsj} - V_{nsi}$. Given density $f\left(\varepsilon_{ns}\right)$, it is possible to re-write Equation (3) as

$$P_{nsj} = \int_{\varepsilon} I\left(\varepsilon_{nsi} - \varepsilon_{nsj} > V_{nsj} - V_{nsi} +, \forall j \neq i\right) f\left(\varepsilon_{ns}\right) d\left(\varepsilon_{ns}\right), \tag{4}$$

where $I\left(.\right)$ is an indicator function equal to 1 if the statement in parentheses is true or zero otherwise.

The utilities obtained from discrete choice models are measured on what is known as an ordinal scale which implies that only differences in utility matter, not the absolute value of utility. In making this statement however, it is necessary to make a distinction between the *level* and *scale* of utility. The level of utility represents the absolute value of utility. Adding or subtracting a constant to the utilities of all *J* alternatives, whilst changing the level of utility, will maintain the relative differences of utility between each of the two alternatives. The scale of utility refers to the relative magnitude of utility. Consider an example where the utilities of all *J* alternatives are multiplied by the same value. The resulting utilities will not change in terms of their relative preference rankings, however the utility differences will change.

The fact that only differences in utility matter has a number of important implications in terms of the identification of discrete choice models. Firstly, it is only possible to estimate parameters when there exist differences across the alternatives. This has important ramifications for the estimation of model constants and covariates, which we discuss later. Secondly, whilst the scale

of utility doesn't matter in that multiplying the utilities of all of the alternatives by the same amount will not change the relative preference rankings, it does play an important role econometrically. Consider Equation (5), in which we multiply utility by some positive amount (i.e., $\lambda > 0$). Note that λ is referred to as a scale parameter in this instance.

$$\lambda U_{nsj} = \lambda\left(V_{nsj} + \varepsilon_{nsj}\right). \tag{5}$$

What becomes apparent from Equation (5), is that the scale of the observed component of utility is intrinsically linked to that of the unobserved component in that both components are affected. Given this fact, it is easy to show that the scale of the observed component of utility will necessarily affect both the mean and variance of the unobserved component of utility. In the latter case, by precisely λ^2 given that $\operatorname{var}\left(\lambda\varepsilon_{nsj}\right) = \lambda^2 \operatorname{var}\left(\varepsilon_{nsj}\right)$.

Discrete choice models in which the unobserved effects are assumed to be drawn from multivariate Normal distributions are known as Probit models. Let $\varepsilon_{ns} = \left\langle \varepsilon_{ns1}, \ldots, \varepsilon_{nsJ} \right\rangle$ be a vector representing each of the *j* unobserved effects. Assuming ε_{ns} follows a multivariate Normal distribution with a mean vector of zero and covariance Ω_e, the density of ε_{ns} may be represented as

$$\Phi\left(\varepsilon_{ns}\right) = \frac{1}{\left(2\pi\right)^{J/2} \det\left(\Omega_e\right)^{1/2}} \exp\left(-\frac{1}{2}\varepsilon_{ns}{}'\Omega_e^{-1}\varepsilon_{ns}\right), \tag{6}$$

where $\det\left(\Omega_e\right)$ is the determinant of the covariance matrix of the unobserved terms, Ω_e. The unobserved effects under the assumption of a multivariate Normal distribution are

$$\varepsilon_{ns} \sim N\left(0, \Omega_e\right). \tag{7}$$

Given that utility is measured using an ordinal scale, it was necessary to normalise one or more elements of the covariance matrix of the unobserved effects in order to set the scale of utility. The most common normalisation we noted involves dividing every element within the covariance matrix by a common value with the aim of setting one of the variance terms to be equal to one. Working with utility directly as opposed to utility differences, let $\operatorname{var}\left(\varepsilon_{nsj}\right) = \sigma_{ij} = \sigma_{jj} = \sigma_j^2, \forall i = j$ represent the variance of the unobserved effect associated with alternative *j*. In order to normalise the variance of ε_{nsj} to one, we divide ε_{nsj} by the square root of its variance. That is, we divide ε_{nsj} by its standard deviation, σ_j. The reasoning for this is given in Equation (8).

$$\operatorname{var}\left(\frac{\varepsilon_{nsj}}{\sigma_j}\right) = \frac{1}{\sigma_j^{\,2}} \operatorname{var}\left(\varepsilon_{nsj}\right) = \frac{1}{\sigma_j^{\,2}}\left(\sigma_j^{\,2}\right) = 1. \tag{8}$$

Note that the normalization process involves dividing all elements within Ω_e by σ_j, and not just σ_{jj}. That is, the normalisation process impacts upon the unobserved effects, both variance and covariances related to the *j* alternatives. Further note that utility is assumed to be linear additive between the unobserved and unobserved effects, such that $U_{nsj} = V_{nsj} + \varepsilon_{nsj}$. As such, any normalisation of one component of utility must also impact upon the other. Hence, normalising of the unobserved effects must also carry through to the observed component of utility; simply put, if you divide ε_{nsj} by some amount, you must divide V_{nsj} by the same amount. As such, a Probit model normalised in the manner described, will by also rescale the observed component of utility. In this instance, the observed components for all *j* alternatives will be rescaled by σ_j. That is, the parameter estimates from the Probit model will need to be rescaled by the standard deviation of the error term being normalised to 1.0.

The above process is shown in Equation (9). Normalising the error variance to one for alternative *j*, the observed component of utility for all *J* alternatives will be divided by σ_j.

$$U_{nsi} = \frac{V_{nsi}}{\sigma_j} + \frac{\varepsilon_{nsi}}{\sigma_j}, \tag{9}$$

where $\text{var}\left(\varepsilon_{nsi}\right) = 1, \forall i = j.$

5.3.1.1 Deriving the binary Probit model

As noted previously, the modelling approach involves the simultaneous estimation of seven binary Probit models, the error terms of which are allowed to be correlated. For the binary Probit model, decision maker *n* will choose alternative *j* when $U_{nsj} > 0$. Hence, if the utility function for alternative 2 is set to zero, then the decision maker will chose alternative 1 if $U_{ns1} > 0$.

$$\begin{aligned} P\left(U_{nsi} > 0\right) &= P\left(\sum_{k=1}^{K} \beta_k x_{ns1k} + \varepsilon_{ns1}\right) > 0, \\ &= P\left(V_{ns1} + \varepsilon_{ns1}\right) > 0 \\ &= P\left(\varepsilon_{ns1} > -V_{ns1}\right), \\ &= P\left(\varepsilon_{ns1} \le V_{ns1}\right), \\ &= P\left(\varepsilon_{ns1} - \mu_1 \le V_{ns1} - \mu_1\right), \\ &= \Phi\left(\frac{V_{ns1} - \mu_1}{\sigma_1}\right), \end{aligned} \tag{10}$$

Given that the analyst does not observe utility, but rather only whether utility is positive or not (i.e., only whether the individual chooses alternative 1 or not), consider what happens if we scale Equation (4.26) by a positive constant, say *C*. Then,

$$
\begin{aligned}
P\left(CU_{nsi} > 0\right) &= P\left(C\left(\sum_{k=1}^{K}\beta_k x_{ns1k} + \varepsilon_{ns1}\right)\right) > 0 \\
&= P\left(C\varepsilon_{ns1} < C\sum_{k=1}^{K}\beta_k x_{ns1k}\right) \\
&= \Phi\left(\frac{C\sum_{k=1}^{K}\beta_k x_{ns1k}}{C\sigma_1}\right) = \Phi\left(\frac{C\sum_{k=1}^{K}\delta_k x_{ns1k}}{\Sigma_1}\right) = \Phi\left(\frac{C\sum_{k=1}^{K}\beta_k x_{ns1k}}{C\sigma_1}\right).
\end{aligned}
\tag{11}
$$

The implication of Equation (11) is that the model is the same regardless of what σ_1 is. To remove the indeterminacy, we therefore set σ_1 to 1.0. This is a *normalisation* based on how much information about our model will be contained in the observed data. Intuitively, the data contains no information about the scaling of the utility function, only its sign as revealed by whether alternative 1 is chosen or not, which does not change if σ changes.

For the binary case, this implies

$$
\begin{aligned}
U_{ns1} - U_{ns2} &= \left(V_{ns1} + \varepsilon_{ns1}\right) - \left(V_{ns2} + \varepsilon_{ns2}\right) \\
&= V_{ns1} - V_{ns2} + \varepsilon_{ns1} - \varepsilon_{ns2} \\
&= \tilde{V}_{ns1} + \tilde{\varepsilon}_{ns1} > 0.
\end{aligned}
\tag{12}
$$

The binary Probit model as specified above does not allow for the possibility of correlation between ε_{ns1} and ε_{ns2}. Denote that correlation ρ_{12}. Once again, note the limited amount of information available to the analyst within the sample data; observed are only whether alternative 1 or alternative 2 are chosen. Behaviourally, this decision turns on the difference of the two utility functions. In the binary case, whether the correlation between ε_{ns1} and ε_{ns2} is non-zero $\left(\rho_{12} \neq 0\right)$ or not has no influence on the observed outcome. The upshot is that when modelling the utility maximising choice between two alternatives, we have no information on correlation across the two utility functions, as only the sign of the difference is observed (see Equation 12). As such, the correlation in the binary case is normalised to zero. Once more, it is important to note, this is not a substantive assumption. It is a normalization that is mandated by the fact that we only observe the one sign of the difference of the utility functions.

We have left one final loose end in this derivation. In the two specific choice case, we have two random terms. The question remains as to whether the two error terms can have different variances (*i.e.*, $\sigma_1^2 \neq \sigma_2^2$). Depending on the assumptions made, the answer to this question is yes. For example, as $\rho_{12} = 0$ within the model, $\left(\sigma_1^2 + \sigma_2^2\right) = 1$. Obviously, it is not possible to estimate both, or to distinguish σ_1^2 from σ_2^2. However, one might think that if σ_1^2 were fixed at some value, then we could estimate σ_2^2, and indeed, under some circumstances it is possible to estimate the

ratio, σ_1^2 / σ_2^2 . This is a complication of the model, a form of heteroscedasticity, will be considered later.

5.3.1.2 Extensions to the binary Probit model

Several extensions to the Probit model are possible. The first involves a panel version of the Probit model. The discussion to date has assumed that there exist no correlation across the choice observations within a data. In the above discussion about correlation of the error terms, we have purposefully framed the correlation structure in terms of correlation across alternatives. Were several choice observations are associated with a single decision maker however, correlation of the error terms may exist within decision maker. Likewise, the preferences of an individual may be correlated over choice situations. Extensions to the Probit model allow for both, both of which have been assumed in the modelling used for the current project.

A further extension to the Probit model allows for preference heterogeneity where rather than assume all decision makers share the same (average) marginal utility for variable *k* (i.e., β_k), the parameters are allowed to vary (randomly) over decision makers such that different decision makers possess different marginal utilities for the kth variable, such that we now represent the marginal utility as β_{nk}. In such a model, the random parameters typically are assumed to follow certain parametric probability distributions representing the distribution of preferences over the sampled population. Note that what is being modelled is heterogeneity in the tastes or preferences of the population and not the actually preferences of any particular individual. That is, the model estimates the moments of the parametric distribution of β_{nk}. Once more, we allow for preference heterogeneity in the modelling employed for the current project. In this instance, we allow the parameters associated with the time and remuneration attributes to be randomly distributed.

A further extension to the modelling employed here is an extension of the model by adapting a bivariate Probit approach to allow for up to seven simultaneous binary choices. The bivariate Probit model allows for the estimation of two related binary choice outcomes (e.g., the analyst may have data on the number of doctor visits have had over a period of time as well as the number of times the same decision makers have visited a hospital over the same period of time). In such cases, it would be possible to estimate two independent Probit models, however in doing so, any correlation that exists between the two choices will be ignored. For example, consider two related but separate choices, *A* and *B*, such that

$$
\begin{aligned}
P_{ns1|A} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|1} - \varepsilon_{ns1|1} > V_{ns1|1} - V_{ns2|1}\right) f\left(\varepsilon_{ns|1}\right) d\left(\varepsilon_{ns|1}\right), \\
P_{ns1|2} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|2} - \varepsilon_{ns1|2} > V_{ns1|2} - V_{ns2|2}\right) f\left(\varepsilon_{ns|2}\right) d\left(\varepsilon_{ns|2}\right), \\
P_{ns1|3} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|3} - \varepsilon_{ns1|3} > V_{ns1|3} - V_{ns2|3}\right) f\left(\varepsilon_{ns|3}\right) d\left(\varepsilon_{ns|3}\right), \\
P_{ns1|4} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|4} - \varepsilon_{ns1|4} > V_{ns1|4} - V_{ns2|4}\right) f\left(\varepsilon_{ns|4}\right) d\left(\varepsilon_{ns|4}\right), \\
P_{ns1|5} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|5} - \varepsilon_{ns1|5} > V_{ns1|5} - V_{ns2|5}\right) f\left(\varepsilon_{ns|5}\right) d\left(\varepsilon_{ns|5}\right), \\
P_{ns1|6} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|6} - \varepsilon_{ns1|6} > V_{ns1|6} - V_{ns2|6}\right) f\left(\varepsilon_{ns|6}\right) d\left(\varepsilon_{ns|6}\right), \\
P_{ns1|7} &= \int_{\varepsilon} I\left(\varepsilon_{ns2|7} - \varepsilon_{ns1|7} > V_{ns1|7} - V_{ns2|7}\right) f\left(\varepsilon_{ns|7}\right) d\left(\varepsilon_{ns|7}\right),
\end{aligned}
\tag{13}
$$

where $I(.)$ is an indicator function equal to 1 if the statement in parentheses is true or zero otherwise. Assuming both choices are related (i.e., correlated), then the error terms between the two models will be correlated. In the case of the bivariate Probit model, the error terms are assumed to be

$$\varepsilon_{ns} \sim MVN\left(\begin{matrix}0\\0\\0\\0\\0\\0\\0\end{matrix}, \begin{pmatrix} 1 & \rho_{12} & \rho_{13} & \rho_{14} & \rho_{15} & \rho_{16} & \rho_{17} \\ \rho_{12} & 1 & \rho_{23} & \rho_{24} & \rho_{25} & \rho_{26} & \rho_{27} \\ \rho_{13} & \rho_{23} & 1 & \rho_{34} & \rho_{35} & \rho_{36} & \rho_{37} \\ \rho_{14} & \rho_{24} & \rho_{34} & 1 & \rho_{45} & \rho_{46} & \rho_{47} \\ \rho_{15} & \rho_{25} & \rho_{35} & \rho_{45} & 1 & \rho_{56} & \rho_{57} \\ \rho_{16} & \rho_{26} & \rho_{36} & \rho_{46} & \rho_{56} & 1 & \rho_{67} \\ \rho_{17} & \rho_{27} & \rho_{37} & \rho_{47} & \rho_{57} & \rho_{67} & 1 \end{pmatrix}\right). \tag{14}$$

In the bivariate Probit case, only two binary choices are observed and hence only a single correlation parameter, ρ_{12}, estimated, which may be directly computed. In the above case, estimation of the correlation parameters cannot be computed directly.

Rather, to estimate the correlation structure shown in Equation (14), we draw directly from the multivariate distribution. Given that the simultaneous equations estimated for the sequence of binary Probit models assumes a multivariate Normal distribution for the error terms, it is possible to the correlation structure using a process known as Cholesky factorization or alternatively, Cholesky transformation. Cholesky factorization involves constructing a lower triangular matrix, *C*, such that $\Omega_e = CC'$ as shown in Equation (15)

$$\begin{pmatrix} \rho_{11} & \rho_{12} & \rho_{13} & \rho_{14} & \rho_{15} & \rho_{16} & \rho_{17} \\ \rho_{12} & \rho_{22} & \rho_{23} & \rho_{24} & \rho_{25} & \rho_{26} & \rho_{27} \\ \rho_{13} & \rho_{23} & \rho_{33} & \rho_{34} & \rho_{35} & \rho_{36} & \rho_{37} \\ \rho_{14} & \rho_{24} & \rho_{34} & \rho_{44} & \rho_{45} & \rho_{46} & \rho_{47} \\ \rho_{15} & \rho_{25} & \rho_{35} & \rho_{45} & \rho_{55} & \rho_{56} & \rho_{57} \\ \rho_{16} & \rho_{26} & \rho_{36} & \rho_{46} & \rho_{56} & \rho_{66} & \rho_{67} \\ \rho_{17} & \rho_{27} & \rho_{37} & \rho_{47} & \rho_{57} & \rho_{67} & \rho_{77} \end{pmatrix} = \begin{pmatrix} s_{11} & 0 & 0 & 0 & 0 & 0_{16} & 0 \\ s_{12} & s_{22} & 0 & 0 & 0 & 0 & 0 \\ s_{13} & s_{23} & s_{33} & 0 & 0 & 0 & 0 \\ s_{14} & s_{24} & s_{34} & s_{44} & 0 & 0 & 0 \\ s_{15} & s_{25} & s_{35} & s_{45} & s_{55} & 0 & 0 \\ s_{16} & s_{26} & s_{36} & s_{46} & s_{56} & s_{66} & 0 \\ s_{17} & s_{27} & s_{37} & s_{47} & s_{57} & s_{67} & s_{77} \end{pmatrix} \begin{pmatrix} s_{11} & s_{12} & s_{13} & s_{14} & s_{15} & s_{16} & s_{17} \\ 0 & s_{22} & s_{23} & s_{24} & s_{25} & s_{26} & s_{27} \\ 0 & 0 & s_{33} & s_{34} & s_{35} & s_{36} & s_{37} \\ 0 & 0 & 0 & s_{44} & s_{45} & s_{46} & s_{47} \\ 0 & 0 & 0 & 0 & s_{55} & s_{56} & s_{57} \\ 0 & 0 & 0 & 0 & 0 & s_{66} & s_{67} \\ 0 & 0 & 0 & 0 & 0 & 0 & s_{77} \end{pmatrix}. \tag{15}$$

Once computed, the values for ρ_{ij} may then be determined such that

$$\begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \\ \varepsilon_7 \end{pmatrix} = \left(\begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} s_{11} & 0 & 0 & 0 & 0 & 0_{16} & 0 \\ s_{12} & s_{22} & 0 & 0 & 0 & 0 & 0 \\ s_{13} & s_{23} & s_{33} & 0 & 0 & 0 & 0 \\ s_{14} & s_{24} & s_{34} & s_{44} & 0 & 0 & 0 \\ s_{15} & s_{25} & s_{35} & s_{45} & s_{55} & 0 & 0 \\ s_{16} & s_{26} & s_{36} & s_{46} & s_{56} & s_{66} & 0 \\ s_{17} & s_{27} & s_{37} & s_{47} & s_{57} & s_{67} & s_{77} \end{pmatrix} \begin{pmatrix} z_1 \\ z_2 \\ z_3 \\ z_4 \\ z_5 \\ z_6 \\ z_7 \end{pmatrix} \right), \tag{16}$$

which may be rewritten as

$$
\begin{aligned}
\varepsilon_1 &= s_{11}z_1, \\
\varepsilon_2 &= s_{21}z_1 + s_{22}z_2, \\
\varepsilon_3 &= s_{31}z_1 + s_{32}z_2 + s_{33}z_3, \\
&\vdots \\
\varepsilon_7 &= s_{71}z_1 + s_{72}z_2 + s_{73}z_3 + s_{74}z_4 + s_{75}z_5 + s_{76}z_4,
\end{aligned}
\tag{17}
$$

where s_{kl} are parameters to be estimated and z_k are draws from univariate standard Normal distributions.

Equation (15) subsequent discussion represents the general case. For model identification, it should be noted that we have $\rho_{ij} = 1, \forall i = j = 1$.

5.3.1.3 Marginal rates of substation

Of particular interest to the Fair Work Commission is the value of time employees covered under the Restaurant Industry Award 2010 and the General Retail Industry Award 2010 awards have. This information can be used to establish acceptable levels of remuneration for those covered under these awards. To do this, we make use of the concept of marginal rates of substitution (MRS) (more commonly referred to as willingness to pay (WTP) measures in consumer settings). The literature has identified two primary types of MRS measures that can be derived from models of discrete choice; MRS and total rates of substation RS. In this project we deal solely with the concept of MRS (for a discussion of total RS measures, see e.g., Train 2009).

Typically, MRS describes how much the cost attribute, x_c, would be required to change given a one unit change in an attribute, x_k, such that the change in total utility U_{nsj} will be zero. In other words, how much someone is willing to pay extra for an increase in another attribute. The current context differs in that respondents are not purchasing anything, but rather being offered work shifts, and hence remuneration. In this sense, the MRS is more aligned with the concept of willingness to accept, that is, how much remuneration is required in order to induce workers to work an additional hour.

The MRS is calculated by taking the ratio of the derivatives towards both the attribute of interest and cost, which in the case of a linear in the attributes indirect utility specification, is given by Equation (9), where we have omitted indices *n*, *s*, and *j*.

$$
MRS_k = -\frac{\Delta x_c}{\Delta x_k} = -\frac{\frac{dV}{dx_k}}{\frac{dV}{dx_c}} = -\frac{\beta_k}{\beta_c}. \tag{18}
$$

To explain the negative sign in Equation (18), note that the MRS is typically negative. In the current study, it is expected that the attribute associated with having to work an additional hour will be associated with a negative parameter (e.g., it is an undesirable outcome), whilst the cost, or pay attribute in this context will have a positive parameter. The negative sign in Equation (18)

accounts for these expectations. See de Bekker-Grob et al (2013) for a more detailed discussion of the calculation of MRS for DCE data.

The MRS formula given in Equation (18) can be problematic when models with random parameters are used. The specific distributional forms that should be adopted for random coefficients has been heavily debated within the literature, mainly with respect to properties such as whether the distribution is unbounded and/or unrestricted in sign. Of particular importance is the distribution used for the cost coefficient, as division by zero yields infinite MRSs and therefore distributions with a positive probability mass at zero are problematic. A common choice for distributions has been the normal distribution, alongside a fixed coefficient for the price attribute (e.g., Revelt and Train 1998). Hess et al. (2005) argued that one should avoid using unbounded distributions, like the normal distribution, for travel time and cost coefficients, as this can lead to wrong interpretations. Scarpa et al. (2008) state that assuming a fixed cost coefficient is counter-intuitive and that preferences (and/or scale) should vary across respondents with regards to cost, whilst Daly et al. (2012) mention that relying on a fixed cost coefficient may lead to inferior models by assuming no heterogeneity, and may lead to biases due to confounding the other coefficients. To overcome some of the above mentioned problems, bounded and sign restricted distributions have been proposed, like the lognormal distribution, censored normal distribution, and the Johnson SB distribution (Train and Sonnier 2005). Others have argued that using lognormals, due to the presence of heavy tails, may produce biased results, while any sign restriction on the distribution might not reflect the actual empirical data (Hensher and Greene, 2003; Cirillo and Hetrakul 2010; Hess et al. 2005). Rigby et al. (2009) mention estimation problems with the lognormal distribution and their inability to capture indifference. Hess et al. (2005) suggest using triangular or Johnson SB distributions with bounds estimated from the data. Fosgerau and Bierlaire (2007) propose a test based on semi-nonparametric techniques that assists in choosing a certain distribution. Recently, Daly et al. (2012) have provided a theorem in order to determine whether the distribution for the cost coefficient guarantees finite moments when employed to calculate MRS. They have shown that the normal, uniform and triangular distributions imply infinite moments for the MRS distribution, even if bounded or truncated at zero. The theorem implies that only a select number of distributions for the cost coefficient will guarantee finite moments, such as the lognormal distribution.

Aside from using a select number of distributions, an alternative approach to overcome problems with undefined moments of WTP distributions is to estimate the model in what is termed WTP space as opposed to preference space (e.g., Train and Weeks, 2005; Scarpa et al., 2008). In models estimated in WTP space, the coefficients represent the MRS distributions and hence there exists no need to take the ratio of two coefficients. To understand how models may be estimated directly in WTP space, let us first specify the utility function as separable in hourly payment offer, p, and the remaining k non-payment attributes described by the DCE designated as x_{nsjk}.

$$U_{nsj} = \beta_{np} p_{nsj} + \sum_{k=1}^{K} \beta_{nk} x_{nsjk} + \varepsilon_{nsj}. \qquad (19)$$

The error variance of ε_{nsj} in Equation (19) is as described previously. Given utility is ordinal, it is possible to divide Equation (19) by the scale parameter, λ_n, which is inversely related to the error variance of ε_{nsj}. Such a division does not affect how behaviour is described by the model, however it ensures that the error variances is invariant over respondents

$$U_{nsj} = \left(\beta_{np}/\lambda_n\right) p_{nsj} + \sum_{k=1}^{K} \left(\beta_{nk}/\lambda_n\right) x_{nsjk} + \varepsilon_{nsj}. \tag{20}$$

where ε_{nsj} is multivariate Normally distributed with constant. The utility function may now be defined as $\theta_n = \left(\beta_{np}/\lambda_n\right)$ and $\delta_n = \left(\beta_{nk}/\lambda_n\right)$ such that

$$U_{nsj} = \theta_n p_{nsj} + \sum_{k=1}^{K} \delta_n x_{nsjk} + \varepsilon_{nsj}. \tag{21}$$

The specification described by Equation (21) parameterises preferences in preference space. By re-specifying the utility function as follows however, the model is estimated in WTP space such that the resulting parameters ω_n are the MRS, as opposed to preference parameters.

$$U_{nsj} = \theta_n p_{nsj} + \sum_{k=1}^{K} \theta_n \omega_n x_{nsjk} + \varepsilon_{nsj}. \tag{22}$$

The utility specification described by Equation (22) can be estimated using any form of discrete choice model, including a Probit model specification. The MRS parameters, ω_n, in Equation (22) can therefore be randomly distributed over the population. Given that the parameters ω_n are estimated directly, and hence there no ratios are required, any distribution of ω_n can be assumed. In the current setting, the number of hours distribution is assumed to be Normally random distributions, whilst the remuneration parameter is assumed to follow a Rayleigh distribution.

The parameter θ_n can be interrupted jointly as both the remuneration parameter and scale parameter. One potentially problem with the model arises when applied to the second DCE, as the WTP space model specification only allows for a single remuneration parameter to be estimated. That is, because the scale and remuneration parameters are the same, and the model allows for only a single scale parameter, the model also assumes only a single remuneration parameter. For the second DCE, it is possible that respondents have a different marginal utility for remuneration on a public holiday compared to a non-public holiday. To account for this, we re-specify the remuneration parameter in Equation (22) as

$$\varphi_n = \theta_n \exp\left(\eta d_{(ph)nsj}\right), \tag{23}$$

where $d_{(ph)nsj}$ is a dummy indicating the alternative represents a public holiday, and η is a parameter to be estimated. If $\eta = 0$ then $\varphi_n = \theta_n$ suggesting that the marginal utility for remuneration is the same for public holidays as for a normal working week. If $\eta \neq 0$ then the marginal utility for remuneration on a public holiday compared to a non-public holiday are statistically different.

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5.3.1.4 Model estimation

Given data, the objective of the analyst is to estimate the unknown parameters, β. Whilst there exist several methods to do so, the most common approach when dealing with discrete choice data is to use a method known as maximum likelihood estimation. Maximum likelihood estimation involves the analyst specifying some objective function, known as a likelihood function, where the only unknowns are the parameters which are related to the data via the analyst defined utility specifications, and then maximizing the function. Given that the parameters are the only unknowns, the data being fixed, they remain the only component of the equation that can change in maximizing the likelihood function. The difficulty therefore is in deriving a likelihood function that is appropriate for the problem, that being identifying the parameters that best fit the data.

The likelihood function of discrete choice models is designed to maximize the choice probabilities associated with the alternatives that are observed to be chosen in the data. That is, the likelihood function is defined in such a way as to maximize the predictions obtained by the model. To demonstrate, let y_{nsj} equal one if *j* is the chosen alternative in choice situation *s* faced by decision maker *n*, and zero otherwise. In other words, *y* represents the observed choice outcomes within some data. Then the parameters can be estimated by maximizing the likelihood function *L*,

$$L_{NS} = \prod_{n=1}^{N} \prod_{s \in S_n} \prod_{j \in J_{ns}} \left(P_{nsj} \right)^{y_{nsj}}. \tag{24}$$

where *N* denotes the total number of decision makers and S_n is the set of choice situations faced by decision maker *n*, and P_{nsj} is a function of the data and unknown parameters β.

It is more common to maximize the log of the likelihood function rather than the likelihood function itself. This is because taking the product of a series of probabilities will typically produce values that are extremely small, particularly as *n*, *s* and *j* increase. Unfortunately, most software will be unable to adequately handle such small numbers, having to resort to rounding, which in turn will affect the estimation results. By taking the logs of the probabilities first, large negative values will result, which when multiplied, produce even larger negative values. As such, the log-likelihood function of the model, shown below, is typically preferred.

$$LL_{NS} = \ln \left[\prod_{n=1}^{N} \prod_{s \in S_n} \prod_{j \in J_{ns}} \left(P_{nsj} \right)^{y_{nsj}} \right]. \tag{25}$$

Further assumptions are often made about the log-likelihood function, resulting in different econometric models.

Several discrete choice models assume that (some of) the parameters are randomly distributed over the population, where typically the random parameters are assumed to follow certain parametric probability distributions (there exist several models that allow for non- or semi-parametric representations of the probability distributions (e.g., Briesch et al. 2010, Fosgerau 2006, Klein and Spady 1993), however these models remain outside of the scope of the current text). The Probit model is an example of one such model, where (subject to restrictions) the error terms are parameters to be estimated under the assumption that they are Normally distributed over the sample population. Further, as discussed in the previous chapter, the Probit model can

be extended to allow for tastes to be Normally (and log-Normally) distributed over the sampled population. Of importance is the fact that for these models, the estimated parameters describe the moments of the assumed distributions for the sampled population. Where a particular individual resides within the distribution is not known (although it can be guessed at). Thus, for each individual, it is therefore necessary to evaluate the choice probabilities over the entire real line represented by the population level distributions. Hence, the probability that respondent *n* in choice situation *s* will choice alternative *j* can be written as

$$L_{nsj} = \int_{\beta} P_{nsj}(\beta) f(\beta \mid \theta) d\beta, \tag{26}$$

where $f(\beta \mid \theta)$ is the multivariate probability density function of β, given the distributional parameters θ. The P_{nsj} may be either Logit or Probit choice probability depending on the model assumed. Equation (26) can be generalized by adopting a transformation of β such that the multivariate distribution may be represented in a form that is parameter-free. Thus

$$L_{nsj} = \int_{z} P_{nsj}\left(\beta(z \mid \theta)\right) \phi(z) dz, \tag{27}$$

where $\beta(z \mid \theta)$ is a function of *z* with parameters θ, and where $\phi(z)$ is a multivariate standard distribution of *z*. Models involving multivariate distributions are generally limited to situations in which all random parameters are assumed to be normally distributed, and involve correlating the random parameters via a process known as Cholesky decomposition. Where one or more parameters are not normally distributed, or even when all random parameters are normally distributed, it is far more common to assume (independent) univariate distributions such that Equation (27) can be written as

$$L_{nsj} = \int_{z_1} \cdots \int_{z_K} P_{nsj}\left(\beta_1(z_1 \mid \theta_1), \ldots, \beta_K(z_K \mid \theta_K)\right) \phi_1(z_1) \cdots \phi_K(z_K) dz_1 \cdots dz_K. \tag{28}$$

The assumption of separate univariate distributions for each parameter allows for the mixing of different distributions within the same model for different random parameters. For example, if $\beta_1 \sim N(\mu, \sigma)$, and $\beta_2 \sim U(a,b)$, then L_{nsj} may be written as

$$L_{nsj} = \int_{z_1} \int_{z_2} P_{nsj}\left(\beta_1(z_1 \mid \mu, \sigma), \beta_2(z_2 \mid a, b)\right) \phi_1(z_1) \phi_2(z_2) dz_1 dz_2, \tag{29}$$

where $\beta_1(z_1 \mid \mu, \sigma) = \mu + \sigma z_1$ with $z_1 \sim N(0,1)$ and $\beta_2(z_2 \mid a, b) = a + (b-a) z_2$ with $z_2 \sim U(0,1)$.

The integrals in Equation (26) to (29) do not have a closed analytical form, meaning that they must be evaluated using either Pseudo Monte Carlo or Quasi-Monte Carlo methods. These methods involve simulating the parameters and choice probabilities, and involve taking *R* draws for each of the *K* random terms or parameters, calculating the choice probabilities for each of the draws, and the averaging the probabilities over the draws. That is, let $\beta^{(r)}$ denote a *K* × 1 vector of parameters associated with draw *r*, $r = 1, \ldots, R$, such that $\beta^{(r)} = [\beta_1^{(r)}, \ldots, \beta_K^{(r)}]$, with corresponding random distributions described by probability density functions $\phi_k(\beta_k \mid z_k)$. Given data, *X*, the approximation of the choice probability can be formalized as

$$L_{nsj} = E(P_{nsj}) \approx \frac{1}{R}\sum_{r=1}^{R} f(\beta^{(r)} \mid X). \tag{30}$$

The simulated log-likelihood function is then computed using the expected probability computed from Equation (30). That is, the expected likelihood function (or typically, the logarithm) is maximized based on the simulated draws, where the maximisation process is referred to as simulated maximum likelihood. That is, the log-likelihood function of the model becomes

$$L\left(E\left(L_{NS}\right)\right) = \ln E\left(\left[\prod_{n=1}^{N}\prod_{s\in S_n}\prod_{j\in J_{ns}}\left(P_{nsj}\right)^{y_{nsj}}\right]\right). \tag{31}$$

Assuming independence between the responses of the individual decision makers, *n* and choice situations *s*, the simulated maximum likelihood becomes

$$\begin{aligned} L\left(E\left(L_{NS}\right)\right) &= \log E\left(\prod_{n=1}^{N}\prod_{s\in S_n}\prod_{j\in J_{ns}}\left(P_{nsj}\right)^{y_{nsj}}\right) \\ &= \sum_{n=1}^{N}\sum_{s\in S_n}\sum_{j\in J_{ns}} y_{nsj}\log E\left(P_{nsj}\right), \end{aligned} \tag{32}$$

which represents the simulated log-likelihood function for the cross-sectional version of the model.

5.3.2 Model results

Table 12 presents the modelling results obtained from the two DCE experiments. In total, the results from four models are presented, two for each of the awards. For both awards types, two models are given in Table 12, one based on the DCE examining the value of time for work during a normal work week, and the second addressing the value of work time for a week in which a public holiday falls. All four models are Probit models as discussed in Section 5.3.1 of this report. The models were estimated using Python Biogeme (Bierlaire, 2003) using the CFSQP algorithm and 500 Halton draws (see Train 2009). All four models provide good model fits for the data (i.e., a ρ^2 of 0.2 or more is considered a good model fit for such models; see Hensher et al. 2015).

The parameters of main interest are represented as random parameters within each of the four models. The Hourly pay parameter was estimated assuming a Rayleigh distribution (without an offset parameter, hence why only a standard deviation parameter is reported). The Rayleigh distribution was selected as the distribution is shaped approximately like a log-normal distribution and similar to a log-normal distribution, is confined to the positive domain. Behaviourally, due to the fact that the models are estimated in WTP-space as opposed to preference space, the Hourly pay parameter is perfectly confounded with scale, and as such it can be ignored for the purposes of this report. Likewise, the public holiday offset parameters associated with the DCEs involving the presence of a public holiday, can be ignored, being also confounded with scale (see Equation 23). Nevertheless it is interesting to note that the offset parameters are statistically significant and negative, suggesting lower scale and/or sensitivity for payment for public holidays relative to non-public holidays.

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Table 12: Probit model results obtained from the DCE data

	Restaurant Industry Award 2010				General Retail Industry Award 2010			
	Normal working week		Week with public holiday		Normal working week		Week with public holiday	
	Par.	*(rob t-rat.)*	*Par.*	*(rob t-rat.)*	*Par.*	*(rob t-rat.)*	*Par.*	*(rob t-rat.)*
Alternative specific constants								
ASC1	-12.80	(-4.33)	-16.00	(-3.29)	-2.25	(-0.42)	-5.41	(-1.31)
ASC2	-11.70	(-3.80)	-12.10	(-2.38)	-9.81	(-1.86)	-10.10	(-2.08)
ASC3	-9.60	(-3.08)	-12.90	(-2.76)	-6.56	(-1.26)	-10.10	(-2.27)
ASC4	-9.98	(-3.38)	-14.10	(-2.60)	-6.43	(-1.37)	-7.06	(-1.64)
ASC5	-9.51	(-3.16)	-14.80	(-2.95)	-7.55	(-1.45)	-14.50	(-3.21)
ASC6	-7.32	(-2.38)	-14.20	(-2.69)	-4.74	(-0.89)	-12.00	(-2.67)
ASC7	-4.76	(-1.48)	-8.52	(-1.88)	0.92	(0.17)	-6.60	(-1.56)
Random parameters								
Hourly pay (std dev.)	0.07	(11.12)	0.07	(9.76)	0.05	(8.75)	0.05	(10.10)
Public holiday offset	-	-	-2.04	(-11.82)	-	-	-1.12	(-8.35)
Normal hourly rate (mean)	-21.50	(-23.96)	-20.90	(-14.83)	-24.60	(-18.74)	-23.10	(-21.46)
Normal hourly rate (std dev.)	3.60	(5.69)	4.58	(8.53)	5.05	(5.59)	5.17	(9.14)
Public holiday hourly rate (mean)	-	-	-27.30	(-7.20)	-	-	-36.10	(-22.49)
Public holiday hourly rate (std dev.)	-	-	6.63	(2.41)	-	-	9.93	(9.08)
Fixed parameters								
Saturday dummy	-8.17	(-4.52)	-5.70	(-2.45)	-2.50	(-0.96)	-0.27	(-0.09)
Sunday dummy	-10.60	(-4.51)	-6.85	(-2.87)	-9.80	(-6.80)	-13.10	(-4.15)
Morning shift dummy	2.04	(1.55)	0.73	(0.46)	-2.13	(-1.30)	-1.61	(-0.94)
Evening shift dummy	-2.30	(-1.00)	-8.21	(-1.49)	3.27	(1.01)	3.75	(1.14)
Full time/Part time dummy	6.75	(1.02)	-0.04	(-0.01)	4.03	(0.57)	-1.03	(-0.21)
Cholesky terms								
S_{21}	0.01	(0.03)	0.02	(0.02)	-1.13	(-3.36)	-0.55	(-1.97)
S_{31}	0.28	(0.83)	0.11	(0.51)	0.00	(-0.01)	-0.32	(-1.38)
S_{32}	-0.05	(-0.12)	0.58	(2.15)	-0.49	(-1.65)	-0.29	(-1.20)
S_{41}	0.30	(0.47)	-0.20	(-0.90)	0.05	(0.21)	0.03	(0.13)
S_{42}	0.12	(0.13)	0.67	(2.45)	-0.11	(-0.35)	-0.07	(-0.16)
S_{43}	0.05	(0.10)	-0.28	(-1.00)	-0.53	(-2.44)	0.17	(0.60)
S_{51}	0.02	(0.05)	-1.32	(-3.35)	0.25	(0.87)	-0.52	(-2.18)
S_{52}	0.04	(0.07)	-0.10	(-0.34)	0.46	(0.89)	-0.49	(-1.39)
S_{53}	0.21	(0.58)	0.22	(0.69)	-0.14	(-0.68)	-0.41	(-1.04)
S_{54}	0.13	(0.24)	0.06	(0.19)	0.22	(0.35)	-0.19	(-0.66)
S_{61}	-0.10	(-0.16)	0.03	(0.12)	0.23	(0.61)	0.16	(0.69)
S_{62}	-0.26	(-0.38)	-0.20	(-0.72)	-0.07	(-0.16)	0.05	(0.11)
S_{63}	-0.45	(-1.55)	-0.03	(-0.15)	0.22	(0.73)	-0.22	(-0.81)
S_{64}	-0.32	(-0.59)	0.53	(1.86)	-0.06	(-0.08)	-0.39	(-1.22)
S_{65}	0.11	(0.15)	-0.13	(-0.34)	-0.16	(-0.53)	-0.37	(-0.72)
S_{71}	0.06	(0.14)	-0.03	(-0.13)	0.51	(1.58)	-0.32	(-1.74)
S_{72}	-0.02	(-0.11)	-0.23	(-1.16)	-0.41	(-1.71)	-0.08	(-0.4)
S_{73}	-0.10	(-0.44)	0.58	(2.14)	-0.28	(-1.10)	0.29	(1.23)
S_{74}	0.00	(-0.01)	0.56	(2.53)	0.04	(0.09)	-0.20	(-1.11)
S_{75}	-0.45	(-1.22)	-0.26	(-0.89)	-0.12	(-0.24)	0.32	(1.49)
S_{76}	0.21	(0.49)	-0.69	(-2.28)	-0.05	(-0.16)	-0.41	(-1.17)
Model fit statistics								
LL(0)	-3609.911		-3609.911		-5007.295		-5007.295	
LL(β)	-2607.574		-2707.309		-3928.011		-3979.259	
ρ^2	0.278		0.250		0.216		0.205	
Adj. ρ^2	0.273		0.245		0.212		0.201	

Given the models are estimated in WTP-space, the parameters Normal hourly rate and Public holiday hourly rate reflect the values at which respondents will accept an offer to work, all else being equal. These parameters are assumed to be randomly distributed over the sample following Normal distributions. Reported therefore are the means and standard deviations of these distributions, all of which are statistically significant within all four models. The negative signs

for the means of the random parameter distributions reflect the fact that the parameters are willingness to accept as opposed to willingness to pay (i.e., how much compensation the respondents requires to work, as opposed to how much are they willing to pay to purchase some good or service), and as such, the sign should be reversed when interpreting the results. Before examining the parameters further, we first note that several other fixed parameters were estimated which must be taken into account when interpreting the results. These represent dummy variables which account for different effects within the data, as well as differences between full time/part time and casual workers.

On average, employees under the Restaurant Industry Award 2010 are willing to accept on average $21.50 per hour (highlighted light blue in the table) to work during a normal work week, *ceteris paribus*. Separate dummies for work on Saturday and Sunday were estimated and found to be statistically significant. As such, these values should be added (actually subtracted from) to the $21.50 to reflect different hourly remuneration requirements for working on these days. As such, adding the $8.17 to $21.50 suggests that on average, employees under the Restaurant Industry Award 2010 are willing to accept work on a Saturday if the remuneration to do so is at least $29.67 per hour. Likewise, the same employee is willing to accept work on a Sunday if the hourly pay rate offered is $32.10. For this segment (and all other segments), the dummies for morning and evening shift were found to be statistically insignificant suggesting that willingness to work during a normal work day remains at the base hourly pay rate of $21.50 irrespective of whether the shift occurs during the morning, evening or night (i.e., respondents do not require penalties for working at these times). Likewise, the full time/part time dummy was found to be statistically insignificant suggesting there were no observable difference in hourly pay of full time/part time and casuals in terms of willingness in order to accept to work.

Similar exercises can be used to calculate the average hourly pay rate for which employees within the General Retail Industry Award 2010 will work for. On average, employees under the General Retail Industry Award 2010 are willing to accept on average $24.60 per hour (highlighted light green in the table) to work during a normal work week, *ceteris paribus*. As before, separate dummies for work on Saturday and Sunday were estimated and found to be statistically significant for Sunday, but not for Saturday. As such, the data suggests that employees under this award do not value time differently for working on a Saturday relative to how they value time on other weekdays. On average, employees under the Restaurant Industry Award 2010 are willing to accept work on a Sunday however if, on average, the hourly rate is $32.10 or greater, all else being equal. As before, the dummies for morning and evening shift, and full time/part time workers, is not statistically significant, hence suggesting no differences exist for these groups within the data.

The second DCE involved the introduction of one or more public holidays into the four scenarios. The results of the two models estimated on the second DCE are found in Table 12 under the columns marked Week with public holiday. Two sets of hourly pay parameters are reported for these models. The first titled Normal hourly rate represents the average dollar values per work hour for non-public holidays that fall within a week in which a public holiday occurs required for respondents to accept work on that day. For example, for employees under the Restaurant Industry Award 2010, the base willingness to work was found to be $20.90 per hourly (shaded dark blue) for non-public holidays that occur in a week where public holiday falls. Also included is a parameter associated with the willingness to work on a public holiday, called Public holiday hourly rate. In this instance, the average hourly pay rate to work on a public holiday was found to be $27.30 (shaded dark grey), which represents a 130.62 percent penalty over the non-public holiday pay rate. For employees employed under the General Retail Industry Award 2010, the

base willingness to work was found to be $23.10 per hourly (shaded orange) for non-public holidays that occur in a week where public holiday falls, which rises to an average hourly pay rate to work on a public holiday of $36.10 (shaded dark green), which represents a 156.28 percent penalty over the non-public holiday pay rate.

Table 13 summaries the hourly pay rates derived based on the above discussion. Also included are 95 percent confidence intervals. Interestingly, based on the confidence intervals, no statistical differences exist between the hourly rates for working during a normal week, and working a non-public holiday during a week when a public holiday falls. This suggests that behaviourally respondents have a similar marginal rate of substitution for non-public holiday working days independent of whether the day falls during a public holiday week or not, indicating that the respondents were not trading these day off working on these days differently with public holidays as was hypothesised.

Table 13: Marginal rates of substitution obtained from the DCE modelling processes

	Restaurant Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	$21.50 ($19.74-$23.26)	$22.50 ($18.08-$26.92)	$32.40 ($27.46-$37.34)
Saturday	$29.67 ($22.64-$36.70)	$22.50 ($18.08-$26.92)	$32.40 ($27.46-$37.34)
Sunday	$32.10 ($21.27-$42.93)	$22.50 ($18.08-$26.92)	$32.40 ($27.46-$37.34)
	General Retail Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	$24.60 ($22.03-$27.17)	$23.30 ($20.59-$26.01)	$35.50 ($31.92-$39.07)
Saturday	$24.60 ($22.03-$27.17)	$23.30 ($20.59-$26.01)	$35.50 ($31.92-$39.07)
Sunday	$34.40 ($25.34-$43.46)	$23.30 ($20.59-$26.01)	$35.50 ($31.92-$39.07)

The above discussion has been limited to an examination of the average MRS obtained from the models. It is noteworthy however that the standard deviation parameters associated with the various normally distributed MRS, are all statistically significant suggesting that there exists significant heterogeneity in these results. This suggests that not all employees share the same remuneration preferences, with some desiring more pay, whilst others would accept less.

The final set of parameters reported in Table 9 are the Cholesky decomposition parameters which are used to calculate the correlation structure of the error terms of the system of Probit model equations. These parameters were estimated to account for statistical considerations, and for the purposes of this report can be ignored.

Despite the above discussion, we advise against directly interpreting the results in the manner discussed. Whilst the discussion represents an accurate description of the model results, we reminder the reader that as per Section 4, Table 6, the average per hourly rate currently being paid for the sampled respondents employed under the General Retail Industry Award 2010 was $21.92, and $21.95 for those working under the Restaurant Industry Award 2010. This suggests that the sample is biased in terms of respondents being paid at above award rates. As such, a more accurate interpretation of the results would be to compare the values obtained from the model to

the average hourly pay rates reported for the respective samples. We do this in Table 14. The values of in Table 14 are computed by dividing the values presented in Table 13 by the current average per hourly rate reported to be paid by the sample. For example, $\$21.50 \div \$21.95 \times 100 = 97.93$. This suggests that those respondents belonging to the Restaurant Industry Award 2010, the threshold hourly pay rate to work on a non-public holiday is 97.93 percent of the average reported hourly pay rate if the day occurs during a normal work week (i.e., a week with no public holidays). This value drops to 95.20 percent of the average reported hourly pay rate if a public holiday falls sometime during the week.

Table 14: Relative marginal rates of substitution

	Restaurant Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	97.93% (89.91% - 105.95%)	95.20% (82.61%-107.79%)	124.35% (96.76%-151.93%)
Saturday	135.14% (103.12% - 167.16%)	121.16% (77.45%-154.55%)	150.31% (91.60%-198.70%)
Sunday	146.21% (96.88% - 195.54%)	126.40% (72.75%-160.32%)	155.55% (86.90%-204.47%)
	General Retail Industry Award 2010		
	Normal working week	*Week with public holiday*	*Public holiday*
Weekday	112.22% (100.50% - 123.95%)	105.38% (95.72%-115.04%)	164.68% (150.38%-178.99%)
Saturday	112.22% (100.50% - 123.95%)	106.62% (122.74%-144.53%)	165.92% (177.40%-208.48%)
Sunday	156.93% (115.60% - 198.26%)	165.14% (64.22%-203.05%)	224.44% (118.87%-267.00%)

By examining the confidence intervals reported within the table, it is possible to determine whether any two values shown are statistically different from one another. Based on this approach, the results suggests that the value the current hourly pay rate for a normal working day is consistent with the current amounts respondents report being paid within industry, and not different if the work day occurs during a week in which a public holiday occurs or not. For the same sample, the threshold hourly pay rate values to work on a non-public holiday falling on a Saturday are 135.14 and 121.16 percent of the current reported hourly weekday pay rate depending on whether the Saturday falls during a week during which a public holiday falls. Once more however, the confidence intervals suggest that these values are not statistically different from one another. Similarly a premium value is placed on working on a normal Sunday, irrespective of whether a public holiday occurs during the week or not. Based on the model results, to work on a Sunday, the threshold value of pay is 146.21 percent of the average reported hourly weekday pay rate for the sample if the Sunday does not occur during a week with a public holiday or 126.40 percent if a public holiday falls on another day during the same week. Again, these values are not statistically different from one another.

The study design also allows one to disentangle the threshold value of pay respondents have for working on a public holiday that falls on a weekday. For employees operating under the Restaurant Industry Award 2010, the average threshold value at which respondents would elect to work on a weekday public holiday was found to be 124.35 percent the existing reported average normal hourly weekday pay rate for the sample. This increases to 150.31 percent if the public holiday falls on a Saturday and 155.55 percent if the public holiday occurs on a Sunday.

Similar conclusions can be made for respondents belonging to the General Retail Industry Award 2010. The threshold hourly pay rate to work on a non-public holiday for this segment was found to be 112.22 percent of the average reported hourly pay rate if the day occurs during a normal work week (i.e., a week with no public holidays). Statistically, this value is slightly higher than the average normal hourly weekday pay rate reported by this segment. For non-public holiday weekdays occurring during a week in which a public holiday falls, this value drops to 105.38 percent of the reported average normal hourly weekday pay rate. Interestingly, this later value is not statistically different to the reported average normal hourly weekday pay rate for the segment, nor statistically different to the 112.22 percent found if the weekday occurs during a normal week.

Examination of the threshold pay rates for weekend work shows a threshold hourly pay rate value to work on a non-public holiday Saturday of 112.22 of the current reported hourly weekday pay rate if the Saturday occurs during a week during which no public holiday falls, or 106.62 percent of the reported hourly weekday pay rate if a public holiday does occur during that same week. Once more however, the confidence intervals suggest that these values are not statistically different from one another. A larger premium is placed on working on a normal Sunday, irrespective of whether a public holiday occurs during the week or not. Based on the model results, to work on a Sunday, the threshold value of pay is 156.93 percent of the average reported hourly weekday pay rate for the sample if the Sunday does not occur during a week with a public holiday or 165.14 percent if a public holiday falls on another day during the same week. However, these values are not statistically different from one another based on the confidence intervals reported.

In terms of working on a public holiday, the average threshold value for employees covered by the General Retail Industry Award 2010 at which they would accept to work was found to be 164.68 percent the existing reported average normal hourly weekday pay rate for the sample, increasing slightly to 165.92 percent if the public holiday falls on a Saturday and to 224.44 percent if the public holiday occurs on a Sunday. Overall, these results suggest that employees covered by the General Retail Industry Award 2010 do not have a premium value for working on a Saturday compared to a Sunday, but do require a premium to work on Sundays, irrespective of whether the day is a public holiday or not.

6. Concluding comments

This document has explained in detail, a study implemented by The Institute for Choice (I4C) and conducted on behalf of the Australian Business Lawyers and Advisors (ABLA) and Australian Business Industrial (ABI) which was specifically designed to provide evidence as to the importance and value employees employed under the Restaurant Industry Award 2010 and the General Retail Industry Award 2010, have for time. Particular emphasis has been placed on employee preferences for remuneration to work during various hours of a potential work week, including during "unsocial hours". Particular emphasis has been placed on examining preferences for working during public holidays.

Based on a survey of 443 respondents, several forms of analysis was conducted so as to address three relevant research questions. The first research question seeks to derive the degree of importance employees hold for different times and days of a typical work week. To address this question, respondents were asked to complete an activity diary, part of which required answering questions as to how important each activity was to the respondent. Given that activities were

defined in a temporal sense, the importance of an activity can be translated into the relative importance of time at which the activity took place.

Based on a rating scale where one represents an activity for which the respondent could not or would not change under any circumstance (and hence is very important) and six represents an activity that could very easily be rescheduled, the average importance for the sample was found to be 2.821 suggesting that respondents mostly view their time as being somewhat difficult to change. Very little variation was found to exist in terms of time importance between the days of the week, with average ratings ranging from 2.721 for Tuesdays to 2.907 for Fridays. Greater levels of variation was found to exist within each day, with an average importance rating of 2.660 for the hours between 6am and midday, increasing to 2.878 between the hours of 1pm and 5pm, with a further increase to 3.213 between the hours of 6pm and midnight, before dropping to 2.569 for the hours between midnight and 6am. This suggests that on average, the sampled population place more importance on their time prior to midday, and after midnight compared to other hours of the day, with the least important time being between 5pm and midnight.

A second component of the study was designed to examine both the level of knowledge employees have about what Public holidays they are entitled to enjoy, and how important each public holiday is to them. To address these two questions, respondents were first asked to complete an unprompted upon ended recall question in which they were asked to name each public holiday associated with the state they work in, and next, to undertake a constant sum task whereby they were asked to allocate 100 points amongst the actual real public holidays in a manner that reflects the importance of each holiday. Unsurprisingly Christmas Day and Easter holidays were the most commonly recalled holidays, followed by ANZAC day, Australia day, the Queen's birthday, and then New Year's Day. State specific public holidays received the lower average importance ratings than nationwide public holidays. On average, Christmas day was rated the most important public holiday, followed by News Year's Eve, Boxing Day, ANZAC Day and then Australia Day. For Easter, Good Friday was rated as being more important than Easter Monday on average. In a similar vein to the unprompted recall task, respondents, respondents tended to rate state based public holidays much lower than nationwide public holidays.

The final aspect of research involved respondents completing two DCEs, in which they were asked to choice whether to accept an offer to work one or more shifts over the course of a week. Each shift was described by a rate of hourly pay for working that shift, the start time and end time of the shift, the length of the shift, and what day the shift was to occur. For the second DCE, one or more of the shifts described was said to fall on a public holiday. Over the course of the DCE, the levels describing each aspect of a shift were varied, after which respondents could re-evaluate whether they would revise working that shift or not. Based on the DCE, a series of Probit models were estimated in order to calculate the threshold level of hourly pay at which respondents would switch from not working to working.

The results of this modelling exercise suggest that the average threshold value of hourly pay at which they would elect to work is actually the average level of pay currently being paid to the sample. This suggests that the employees value their time at precisely their current wage rate. Also based on the model results, it was found that on average, respondents value working on Saturdays as being somewhere between 106 to 135 percent their current normal hourly pay, and for working on Sundays somewhere between 126 and 165 percent of the average current normal hourly pay rate. The hourly rate for working on a public holiday was valued as being between 124 and 224 percent of the average current normal hourly pay rate, with the later higher value being for working on a Public holiday that falls on a Sunday.

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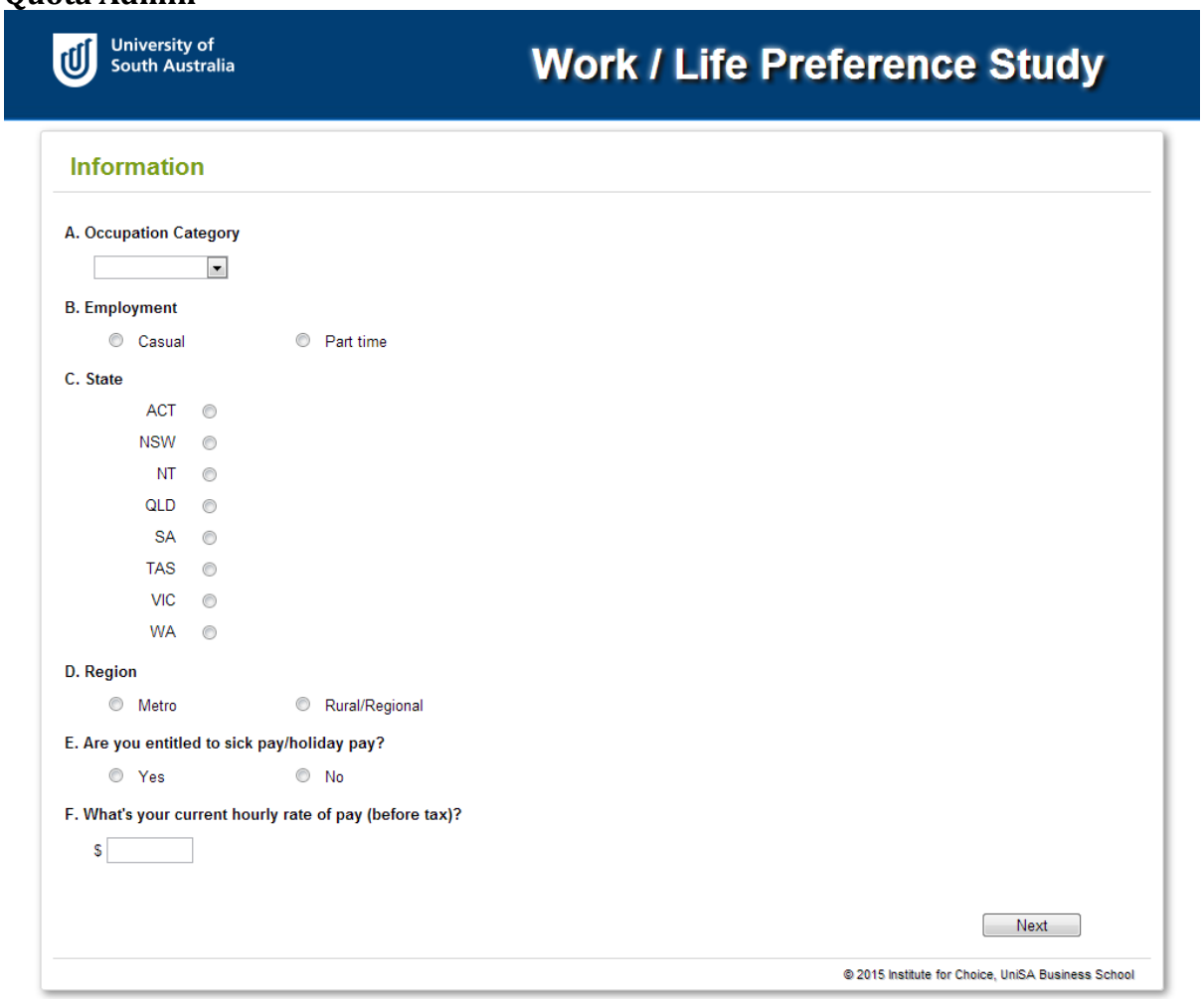
Appendix A: Survey screen captures

Quota Admin



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Survey Information

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Work / Life Preference Study

Survey Information

In the next screen, we will present you with a blank calender for the previous week. We would like you to tell us your what you did during the week. The interviewer will help you complete the calander.

22 Sep 2014 – 28 Sep 2014

	Day 1 Mon, September 22	Day 2 Tue, September 23	Day 3 Wed, September 24	Day 4 Thu, September 25	Day 5 Fri, September 26	Day 6 Sat, September 27	Day 7 Sun, September 28
8 00							
8 30			08:40 am - 10:00 Basic Needs - Coffee/snack *Beach*		08:45 am - 10:05 Recreation/enterta - Exercise alone *Home*		
9 00		09:15 am - 10:15 Travel - Bicycle *Shopping centre 1*				09:10 am - 12:35 Services - Banking *Shopping centre 2*	09:20 am - 11:35 Shopping - Clothing/personal items *Shopping centre 1*
9 30	09:55 am - 12:10 Travel - Bus *Other*						
10 00		10:15 am - 12:15 Basic Needs - Coffee/snack *Shopping centre 1*		10:05 am - 11:30 Household obligations - Attend to children *Shopping centre 1*			
10 30							
11 00							
11 30				11:35 am - 02:30 Basic Needs - Coffee/snack *Beach*			11:35 am - 12:40 Social - Attend bar/club *Home*
PM 12		12:15 pm - 02:25 Travel - Ferry *Home*					12:40 pm - 02:25 Work -
12 30							

After you complete the week calander, we will present you with a number of hypothetical scenarios related to opportunities to work.

Next

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Activity Calendar

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Work / Life Preference Study

Calendar

The interviewer will help you complete the diary. You will need to tell us what you did for the week. We would like to also know how important each activity is to you in terms of whether you would be willing (and able) to change that activity if your work circumstances were to change.

Please consider things such as:

Basic Needs
Travel
Education
Household obligations
Recreation/entertainment
Services
Shopping
Social
Work
Other

14 May 2015 – 20 May 2015

	Day 1 Thu, May 14	Day 2 Fri, May 15	Day 3 Sat, May 16	Day 4 Sun, May 17	Day 5 Mon, May 18	Day 6 Tue, May 19	Day 7 Wed, May 20
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

Next

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Penalty Rates Diary Survey, example game 1: No public holiday

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Work / Life Preference Study

Scenario 1 of 4

In the next few screens, we are going to show you a number of different scenarios. In each scenario, we would like you to assume that your **boss has approached you with a number of shifts that require filling with various hourly pay rates**. We would like you to tell us **which, if any of the shifts you would accept filling in for**. In doing so, we would like you to pretend that **your week is exactly the same as you told** us for the past week (i.e., your schedule is exactly the same). If a shift overlaps with an existing work shift, **accepting the new offer would mean that you would no longer have to work the existing shift**, and you would be paid at the rate shown for the new shift.

We will repeat this four times, each time changing the shift times and pay rates on offer.

We ask that you take this seriously, as the results from this study may be used to help shape policy outcomes in the future. Thus, if you tell us you would accept a shift in the four scenarios, but would not do so in real life, or you would not accept a shift but would really do so in real life, you may impact upon the results in an adverse way which may have implications for workers in the future.

Offers

	Date	Time	Shift Hours	Pay Rates	Accept / Reject	
1	Fri, 15/05/2015	8am ~ 11am	3 hours	$16.21 / hour	Accept	Reject
2	Sat, 16/05/2015	2pm ~ 5pm	3 hours	$22.51 / hour	Accept	Reject
3	Sat, 16/05/2015	3pm ~ 9pm	6 hours	$17.51 / hour	Accept	Reject
4	Sun, 17/05/2015	10am ~ 4pm	6 hours	$48.17 / hour	Accept	Reject
5	Mon, 18/05/2015	2pm ~ 5pm	3 hours	$30.10 / hour	Accept	Reject
6	Tue, 19/05/2015	8am ~ 11am	3 hours	$27.78 / hour	Accept	Reject
7	Tue, 19/05/2015	3pm ~ 9pm	6 hours	$30.10 / hour	Accept	Reject
				Total max potential:	**$0.00**	

14 May 2015 – 20 May 2015

	Day 1 Thu, May 14	Day 2 Fri, May 15	Day 3 Sat, May 16	Day 4 Sun, May 17	Day 5 Mon, May 18	Day 6 Tue, May 19	Day 7 Wed, May 20
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
PM 12							
12 30							

Next

University of South Australia | Institute for Choice

Penalty Rates Diary Survey example game 2: No public holiday

University of South Australia

Work / Life Preference Study

Scenario 2 of 4

In the next few screens, we are going to show you a number of different scenarios. In each scenario, we would like you to assume that your **boss has approached you with a number of shifts that require filling with various hourly pay rates**. We would like you to tell us **which, if any of the shifts you would accept filling in for**. In doing so, we would like you to pretend that **your week is exactly the same as you told** us for the past week (i.e., your schedule is exactly the same). If a shift overlaps with an existing work shift, **accepting the new offer would mean that you would no longer have to work the existing shift**, and you would be paid at the rate shown for the new shift.

Offers

	Date	Time	Shift Hours	Pay Rates	Accept / Reject	
1	Fri, 15/05/2015	10am ~ 4pm	6 hours	$30.10 / hour	Accept	Reject
2	Sat, 16/05/2015	3pm ~ 9pm	6 hours	$22.51 / hour	Accept	Reject
3	Sun, 17/05/2015	8am ~ 11am	3 hours	$25.94 / hour	Accept	Reject
4	Sun, 17/05/2015	2pm ~ 5pm	3 hours	$48.17 / hour	Accept	Reject
5	Mon, 18/05/2015	3pm ~ 9pm	6 hours	$23.15 / hour	Accept	Reject
6	Tue, 19/05/2015	10am ~ 4pm	6 hours	$20.84 / hour	Accept	Reject
7	Wed, 20/05/2015	8am ~ 11am	3 hours	$30.10 / hour	Accept	Reject
				Total max potential:	**$0.00**	

14 May 2015 – 20 May 2015

	Day 1 Thu, May 14	Day 2 Fri, May 15	Day 3 Sat, May 16	Day 4 Sun, May 17	Day 5 Mon, May 18	Day 6 Tue, May 19	Day 7 Wed, May 20
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

Next

University of South Australia | Institute for Choice

Penalty Rates Diary Survey example game 3: No public holiday

University of South Australia

Work / Life Preference Study

Scenario 3 of 4

In the next few screens, we are going to show you a number of different scenarios. In each scenario, we would like you to assume that your **boss has approached you with a number of shifts that require filling with various hourly pay rates**. We would like you to tell us **which, if any of the shifts you would accept filling in for**. In doing so, we would like you to pretend that **your week is exactly the same as you told** us for the past week (i.e., your schedule is exactly the same). If a shift overlaps with an existing work shift, **accepting the new offer would mean that you would no longer have to work the existing shift**, and you would be paid at the rate shown for the new shift.

Offers

	Date	Time	Shift Hours	Pay Rates	Accept / Reject	
1	Thu, 14/05/2015	3pm ~ 9pm	6 hours	$20.84 / hour	Accept	Reject
2	Sat, 16/05/2015	10am ~ 4pm	6 hours	$30.01 / hour	Accept	Reject
3	Sat, 16/05/2015	2pm ~ 5pm	3 hours	$32.51 / hour	Accept	Reject
4	Mon, 18/05/2015	10am ~ 4pm	6 hours	$18.52 / hour	Accept	Reject
5	Mon, 18/05/2015	3pm ~ 9pm	6 hours	$20.84 / hour	Accept	Reject
6	Tue, 19/05/2015	8am ~ 11am	3 hours	$20.84 / hour	Accept	Reject
7	Tue, 19/05/2015	10am ~ 4pm	6 hours	$25.47 / hour	Accept	Reject
				Total max potential:	**$0.00**	

14 May 2015 – 20 May 2015

	Day 1 Thu, May 14	Day 2 Fri, May 15	Day 3 Sat, May 16	Day 4 Sun, May 17	Day 5 Mon, May 18	Day 6 Tue, May 19	Day 7 Wed, May 20
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

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University of South Australia | Institute for Choice

Penalty Rates Diary Survey example game 4: No public holiday

University of South Australia

Work / Life Preference Study

Scenario 4 of 4

In the next few screens, we are going to show you a number of different scenarios. In each scenario, we would like you to assume that your **boss has approached you with a number of shifts that require filling with various hourly pay rates**. We would like you to tell us **which, if any of the shifts you would accept filling in for**. In doing so, we would like you to pretend that **your week is exactly the same as you told** us for the past week (i.e., your schedule is exactly the same). If a shift overlaps with an existing work shift, **accepting the new offer would mean that you would no longer have to work the existing shift**, and you would be paid at the rate shown for the new shift.

Offers

	Date	Time	Shift Hours	Pay Rates	Accept / Reject	
1	Fri, 15/05/2015	2pm ~ 5pm	3 hours	$18.52 / hour	Accept	Reject
2	Sun, 17/05/2015	8am ~ 11am	3 hours	$44.46 / hour	Accept	Reject
3	Sun, 17/05/2015	3pm ~ 9pm	6 hours	$44.46 / hour	Accept	Reject
4	Tue, 19/05/2015	8am ~ 11am	3 hours	$30.10 / hour	Accept	Reject
5	Tue, 19/05/2015	10am ~ 4pm	6 hours	$30.10 / hour	Accept	Reject
6	Tue, 19/05/2015	2pm ~ 5pm	3 hours	$18.52 / hour	Accept	Reject
7	Wed, 20/05/2015	10am ~ 4pm	6 hours	$25.47 / hour	Accept	Reject
				Total max potential:	**$0.00**	

14 May 2015 – 20 May 2015

	Day 1 Thu, May 14	Day 2 Fri, May 15	Day 3 Sat, May 16	Day 4 Sun, May 17	Day 5 Mon, May 18	Day 6 Tue, May 19	Day 7 Wed, May 20
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

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Public Holidays Unprompted

University of South Australia

Work / Life Preference Study

Public Holidays

We would now like to find out your views regarding public holidays. Before we do, we would like for you to tell us what are the public holidays in the state where you reside, and what months they occur.

Note, the number of boxes present does not necessarily reflect the number of public holidays in your state. Click on "+" to add more public holidays.

	Public Holiday	Month it occurs
⊖		
⊖		
⊖		

Next

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Public Holidays Importance

University of South Australia

Work / Life Preference Study

Public Holidays

The actual public holidays in your state are presented below. We are interested in finding out how important each public holiday is to you. Assuming you had 100 points to allocate amongst the various public holidays, with more points indicating greater importance, and less points, less importance, please tell us how important each public holiday is to you.

	Public Holiday	Month it occurs	Points
1	New Year's Day, *Thursday 1 January 2015*	January	0
2	Australia Day, *Monday 26 January 2015*	January	0
3	Good Friday, *Friday 3 April 2015*	April	0
4	Easter Saturday, *Saturday 4 April 2015*	April	0
5	Easter Sunday, *Sunday 5 April 2015*	April	0
6	Easter Monday, *Monday 6 April 2015*	April	0
7	Anzac Day, *Saturday 25 April 2015*	April	0
8	Queen's Birthday, *Monday 8 June 2015*	June	0
9	Labour Day, *Monday 5 October 2015*	October	0
10	Christmas Day, *Friday 25 December 2015*	December	0
11	Boxing Day, *Saturday 26 December 2015*	December	0
12	Boxing Additional Day, *Monday 28 December 2015*	December	0
		Total	0

Next

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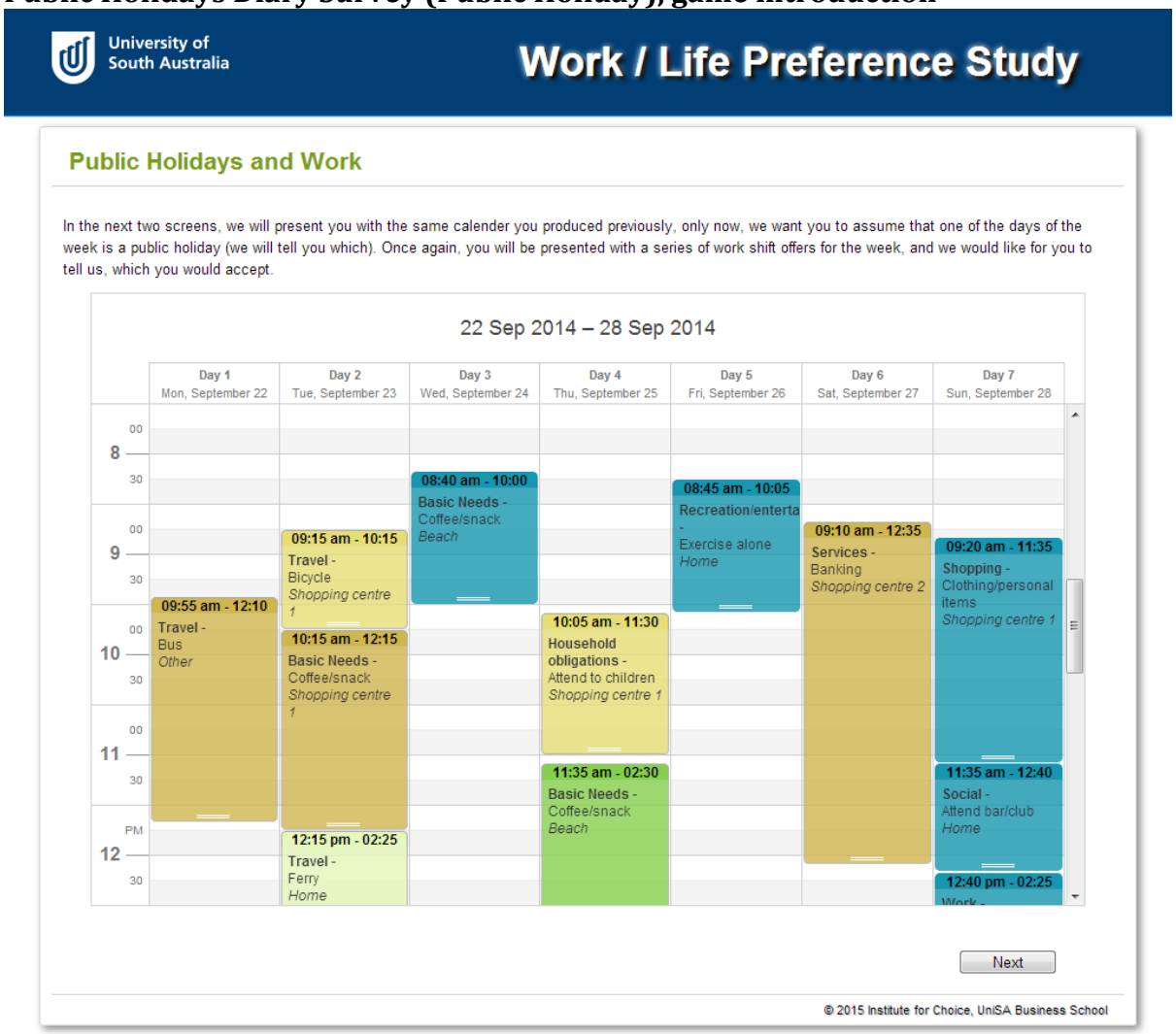
Public Holidays Diary Survey (Public Holiday), game introduction



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Public Holidays Diary Survey example game 1: Public holiday

University of South Australia

Work / Life Preference Study

Scenario 1 of 4

We are now going to show you a number of different scenarios where by you are offered to work alternative hours at different times during the week. Assume that these offers are being made by your current employer. Note that these hours offered are instead of your current hours (that is, **assume that these hours would replace your current work times**).

We will repeat this 4 times, each time changing the times and pay offered. Each time we do this, we want you to think about the shifts offered and tell us whether you would be willing to undertake the shift.

We want you to take this task seriously, as the results may help shape policy outcomes in the future. Thus, by not telling us what you would likely do in real life if you were really presented with these options.

Public Holiday Working Offer

Date	Time	Shift Hours	Pay Rates	Accept / Reject
Thu, January 2015	10am ~ 4pm	6 hours	$18.52 / hour	Accept Reject
Thu, January 2015	2pm ~ 5pm	3 hours	$27.78 / hour	Accept Reject
Fri, January 2015	8am ~ 11am	3 hours	$23.15 / hour	Accept Reject
Fri, January 2015	3pm ~ 9pm	6 hours	$20.84 / hour	Accept Reject
Sun, January 2015	3pm ~ 9pm	6 hours	$25.94 / hour	Accept Reject
Australia Day Tue, January 2015	10am ~ 4pm	6 hours	$66.22 / hour	Accept Reject
Wed, January 2015	3pm ~ 9pm	6 hours	$23.15 / hour	Accept Reject
			Total max potential:	**$0.00**

January 2015

	Day 1 Thursday	Day 2 Friday	Day 3 Saturday	Day 4 Sunday	Day 5 Monday	Day 6 Tuesday	Day 7 Wednesday
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

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Public Holidays Diary Survey example game 1: Public holiday

University of South Australia

Work / Life Preference Study

Scenario 2 of 4

We are now going to show you a number of different scenarios where by you are offered to work alternative hours at different times during the week. Assume that these offers are being made by your current employer. Note that these hours offered are instead of your current hours (that is, **assume that these hours would replace your current work times**).

Public Holiday Working Offer

Date	Time	Shift Hours	Pay Rates	Accept / Reject	
Thu, December 2014	8am ~ 11am	3 hours	$27.78 / hour	Accept	Reject
Thu, December 2014	2pm ~ 5pm	3 hours	$30.10 / hour	Accept	Reject
Thu, December 2014	3pm ~ 9pm	6 hours	$27.78 / hour	Accept	Reject
Fri, December 2014	10am ~ 4pm	6 hours	$16.21 / hour	Accept	Reject
New Year's Day Sat, January 2015	8am ~ 11am	3 hours	$61.13 / hour	Accept	Reject
Tue, January 2015	10am ~ 4pm	6 hours	$16.21 / hour	Accept	Reject
Tue, January 2015	3pm ~ 9pm	6 hours	$27.78 / hour	Accept	Reject
			Total max potential:	**$0.00**	

January 2015

	Day 1 Thursday	Day 2 Friday	Day 3 Saturday	Day 4 Sunday	Day 5 Monday	Day 6 Tuesday	Day 7 Wednesday
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

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Public Holidays Diary Survey example game 1: Public holiday

University of South Australia

Work / Life Preference Study

Scenario 3 of 4

We are now going to show you a number of different scenarios where by you are offered to work alternative hours at different times during the week. Assume that these offers are being made by your current employer. Note that these hours offered are instead of your current hours (that is, **assume that these hours would replace your current work times**).

Public Holiday Working Offer

Date	Time	Shift Hours	Pay Rates	Accept / Reject
Thu, April 2015	8am ~ 11am	3 hours	$16.21 / hour	Accept Reject
Thu, April 2015	2pm ~ 5pm	3 hours	$25.47 / hour	Accept Reject
Good Friday Fri, April 2015	2pm ~ 5pm	3 hours	$45.85 / hour	Accept Reject
Easter Sunday Sun, April 2015	10am ~ 4pm	6 hours	$45.85 / hour	Accept Reject
Easter Monday Mon, April 2015	3pm ~ 9pm	6 hours	$56.03 / hour	Accept Reject
Tue, April 2015	8am ~ 11am	3 hours	$25.47 / hour	Accept Reject
Wed, April 2015	3pm ~ 9pm	6 hours	$30.10 / hour	Accept Reject
			Total max potential:	**$0.00**

April 2015

	Day 1 Thursday	Day 2 Friday	Day 3 Saturday	Day 4 Sunday	Day 5 Monday	Day 6 Tuesday	Day 7 Wednesday
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

Next

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Public Holidays Diary Survey example game 1: Public holiday

University of South Australia

Work / Life Preference Study

Scenario 4 of 4

We are now going to show you a number of different scenarios where by you are offered to work alternative hours at different times during the week. Assume that these offers are being made by your current employer. Note that these hours offered are instead of your current hours (that is, **assume that these hours would replace your current work times**).

Public Holiday Working Offer

Date	Time	Shift Hours	Pay Rates	Accept / Reject	
Thu, April 2015	8am ~ 11am	3 hours	$16.21 / hour	Accept	Reject
Thu, April 2015	10am ~ 4pm	6 hours	$20.84 / hour	Accept	Reject
Thu, April 2015	3pm ~ 9pm	6 hours	$23.15 / hour	Accept	Reject
Easter Sunday Sun, April 2015	2pm ~ 5pm	3 hours	$45.85 / hour	Accept	Reject
Tue, April 2015	8am ~ 11am	3 hours	$16.21 / hour	Accept	Reject
Tue, April 2015	2pm ~ 5pm	3 hours	$25.47 / hour	Accept	Reject
Wed, April 2015	2pm ~ 5pm	3 hours	$16.21 / hour	Accept	Reject
			Total max potential:	**$0.00**	

April 2015

	Day 1 Thursday	Day 2 Friday	Day 3 Saturday	Day 4 Sunday	Day 5 Monday	Day 6 Tuesday	Day 7 Wednesday
8 00							
8 30							
9 00							
9 30							
10 00							
10 30							
11 00							
11 30							
12 PM							
12 30							

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Socio-demographic questions

University of South Australia

Work / Life Preference Study

About You

What is your age group?

- 24 or under
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 and over

What is your gender?

- Male
- Female

How many hours do you work in a typical week?

Which category best describes your annual personal income (before tax)?

- Under $10,400
- $10,400 - $15,599
- $15,600 - $20,799
- $20,800 - $31,199
- $31,200 - $41,599
- $41,600 - $51,999
- $52,000 - $64,999
- $65,000 - $77,999
- $78,000 - $103,999
- $104,000 - $129,999
- $130,000 - $155,999
- $156,000 - $181,999
- $182,000 - $207,999
- $208,000 - $259,999
- $260,000 or more
- Not disclosed

How many cars are owned by your household?

How many adults and children are living in your household?

adults children

Which of these categories best describe your household?

- Person living alone
- Couple only
- Couple with children aged over 14 years
- Couple with children aged under 15 years
- Couple with children aged 0-14 and children over 15 years
- Single parent with child(ren) aged over 14 years
- Single parent child(ren) aged under 15 years
- Single parent with children aged 0-14 and children over 15 years
- Others (please specify)

Next

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Thanks

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Work / Life Preference Study

Thanks

Thank You For Participating In The Survey!

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Appendix B: Data dictionary

Screen: Quota Admin

Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
respid Randomly generated number
ocpclass Occupation Category
1. Retail;
2. Restaurants;
3. Café; or
4. Coffee Shop.

empltype Employment
1. Casual; or
2. Part time.

quostate State
1. ACT;
2. NSW;
3. NT;
4. QLD;
5. SA;
6. TAS;
7. VIC; or
8. WA.

rurorreg Region
1. Metro; or
2. Rural/Regional.

worktype Are you entitled to sick pay/holiday pay?
1. Yes; or
2. No.

hourpay What's your current hourly rate of pay (before tax)? > $1
durquota Duration time on this page, unit: seconds

Non-public holiday choice scenarios: Scenarios 1~4

Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
gameOrd Game index : [1,…,4]
altij Alternative shift on screen: [1,...,7]
viewday Day of shift offer:
1. Monday;
2. Tuesday;
3. Wednesday;
4. Thursday;
5. Friday;
6. Saturday; or
7. Sunday.

viewdate Date of offer for display; Format: Fri, 15/05/2015.
designId Design Id (used to lookup which question was shown; Range: [1,...,10080]
ocpClass Occupation class of respondent

Casual Part time

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	Retail	1	6
	Restaurants	2	7
	Café	3	8
	Coffee Shop	4	9
	Pub/Bar	5	10

scenario Design scenario, [1,...,36]
blockId Design block, [1,...,9]
gameId Design game, [1,...,4]
weekday Day of week, [1,...,7] => [Monday, ..., Sunday]
dayOffer Day offer id, [1,...,4] => 4 different shift periods from design
startHou Shift start hour of start, [0, ..., 23]
endHou Hour shift ends, [0,..., 24],
offHours Number of hours of shift, unit: hrs
offRates Shift offer pay rate, unit: $0.00

Non-public holiday choice data: Scenario 1~4
Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
gameOrd Game index : [1,…,4]
altij Alternative shift on screen: [1,...,7]
arstatus Accept / Reject offer
1. Accept; or
2. Reject.

durgame Duration time on this page, unit: seconds

Unprompted Public Holiday
Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
phtotal Total of unprompted public holiday provided
phij Unprompted index, start from 1
title Public holiday title
month Month in which the public holiday occurs, [1..12]
durphunp Duration time on this page, unit: seconds

Public Holiday importance
Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
quostate State, range [1,..,.8]
phidx Public holiday index
phper Percentage of public holiday index
durphper Duration time on this page, unit: seconds

Public holiday choice scenarios: Scenarios 1~4
Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
gameOrd Game index : [1,…,4]
altij Alternative shift on screen: [1,...,7]
viewday Day of shift offer: [1,..., 7], column id from left to right in view
viewdate Date of offer for display; Format: Fri, 15/05/2015.
designId Design Id (used to lookup which question was shown; Range: [1,...,10080]

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ocpClass Occupation class of respondent; [1,..., 10]

scenario Design scenario, [1,...,36]
blockId Design block, [1,...,9]
gameId Design game, [1,...,4]
weekday Day of week, [1,...,7] => [Monday, ..., Sunday]
dayOffer Day offer id, [1,...,4] => 4 different shift periods from design
startHou Shift start hour of start, [0, ...,23]
endHou Hour shift ends, [0,...,24],
offHours Number of hours of shift, unit: hrs
offRates Shift offer pay rate, unit: $0.00
phdId Id in public holiday list range: [1,..,98]
phstate State ID
phyear Year of public holiday
phsidx Public holiday index, start from 1
phwkday Day of public holiday in game: [1,…,7]
phtitle Public holiday name
phmonth Month of public holiday [1,..,12]

Public holiday choice data: Scenario 1~4

Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
gameOrd Game index : [1,…,4]
altij Alternative shift on screen: [1,...,7]
arstatus Accept / Reject offer
1. Accept; or
2. Reject.

durgame Duration time on this page, unit: seconds

Socio-demographic questions

Id Sequence identity; ≥ 1
SurveyId Survey identity; ≥ 1
agegroup What is your age group?
1. 24 or under;
2. 25 to 34;
3. 35 to 44;
4. 45 to 54;
5. 55 to 64; or
6. 65 and over.

gender What is your gender?
1. Male; or
2. Female.

workhrs How many hours do you work in a typical week?
income Which category best describes your annual personal income (before tax)?
1. Under $10,400;
2. $10,400 - $15,599;
3. $15,600 - $20,799;
4. $20,800 - $31,199;
5. $31,200 - $41,599;
6. $41,600 - $51,999;

7. $52,000 - $64,999;
8. $65,000 - $77,999;
9. $78,000 - $103,999;
10. $104,000 - $129,999;
11. $130,000 - $155,999;
12. $156,000 - $181,999;
13. $182,000 - $207,999;
14. $208,000 - $259,999;
15. $260,000 or more; or
16. Not disclosed

carsown How many cars are owned by your household?

adults Number of adults living in household

children Number of children living in household

hhdesc Which of these categories best describe your household?

1. Person living alone;
2. Couple with children aged 0-14 and children over 15 years;
3. Couple only;
4. Single parent with child(ren) aged over 14 years;
5. Couple with children aged over 14 years;
6. Single parent child(ren) aged under 15 years;
7. Couple with children aged under 15 years;
8. Single parent with children aged 0-14 and children over 15 years; or
9. Others (please specify).

dursocio Duration time on this page, unit: seconds

Activity Event Data

event_id Event id

respond_id Randomly generated respondent Id

survey_id Survey id

survey_stage Survey running stage, refer to:

3. Diary Entry;
5. PRDS game 1;
6. PRDS game 2;
7. PRDS game 3;
8. PRDS game 4;
13. PHDS game 1;
14. PHDS game 2;
15. PHDS game 3;
16. PHDS game 4

start_date Event start date & time, DEFAULT datetime('now','localtime')

end_date Event end date & time, DEFAULT datetime('now','5 minutes','localtime')

event_name Event name, description

activity_type Activity type

1. Basic Needs;
2. Travel;
3. Education;
4. Household obligations;
5. Recreation/entertainment;
6. Services;
7. Shopping;

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8. Social;
9. Work; or
10. Other.

activity_detail Activity sub-category

101. Coffee/snack;
102. Eat delivered/picked up meal;
103. Eat at restaurant;
104. Eat prepared meal;
105. Sleep;
106. Wash/dress/pack;
107. Other basic need;
201. Bicycle;
202. Bus;
203. Car;
204. Ferry;
205. Taxi;
206. Train;
207. Tram;
208 Walk;
301. Education related extracurricular activity;
302. School;
303. TAFE;
304. University;
401. Attend to children;
402. Chauffeuring;
403. Cleaning/maintenance;
404. Meal preparation;
405. Other errand;
406. Pick-up involved person;
407. Other obligation;
501. Exercise alone;
502. Exercise at gym;
503. Hobby (gardening; etc.);
504 Movie/Theatre;
505. Park; recreational area;
506. Play sport;
507. Play with children;
508. Read;
509. Relax (nap);
510. Surf internet;
511. Watch Movie;
512. Watch regular TV program;
513. Watch unspecified TV;
514. Other;
601. Banking;
602. Dentist;
603. Doctor;
604. Other professional;
605. Personal (salon; barber; etc.);
606. Other service;

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701. Clothing/personal items;
702. Convenience store;
703. Drug store;
704. Housewares;
705. Major grocery shop (> 10 items);
706. Minor grocery shop (< 10 items);
707. Mostly browsing;
708. Pick-up meal;
709. Other;
801. Attend bar/club;
802. Cultural event;
803. Help other;
804. Host visitors;
805. Phone/email;
806. Planned social event;
807. Religious event;
808. Spend time with family;
809. Spend time with partner;
810. Visit friends;
901. My full time job;
902. My part time job;
903. Volunteer work; or
1001. Other.

location Activity location class

1. Beach;
2. Friend's 1 house;
3. Friend's 2 house;
4. Friend's 3 house;
5. Gym;
6. Home;
7. Immediate family's house;
8. Park;
9. Partners house;
10. Professional's office;
11. Relatives house;
12. Restaurant 1;
13. Restaurant 2;
14. Restaurant 3;
15. Shopping centre 1;
16. Shopping centre 2;
17. Shopping centre 3;
18. Work location 1;
19. Work location 2;
20. Work location 3;
21. School;
22. TAFE;
23. University;
24. Other.

costs Spending or travel cost in dollar

importance Activity importance level, for colouring

1. Critical (Could never miss);
2. Very high (Very difficult to change);
3. High (Difficult to change);
4. Moderate (Could change with some degree of difficulty);
5. Low (Could reschedule or change/miss); or
6. Very low (Could easily reschedule or change/miss).

companion Companion symbols, +: joined, .: not join with, DEFAULT "+.....", 16 chars

1. Myself, always +;
2. My partner;
3. Child 1;
4. Child 2;
5. Friend 1;
6. Friend 2;
7. Friend 3;
8. Friend 4;
9. Parent 1;
10. Parent 2;
11. Relative 1;
12. Relative 2;
13. Work colleague 1;
14. Work colleague 2;
15. Work colleague 3;
16. Work colleague 4

travel_mode Travel mode

1. Bicycle;
2. Bus;
3. Car;
4. Ferry;
5. Taxi;
6. Train;
7. Tram;
8. Walk

travel_time Travel time in minutes