

**The Impact of Framing Effects on the Risks
Taxpayers take when Filing Income Tax Returns:
A New Zealand Replication of a
Prospect Theory-based Laboratory Experiment**

A findings of a research proposal for a social science laboratory experiment to determine shifts in taxpayer risk profiles in accordance with theories of decision making under risk

Prepared for:

**National Research Unit
Inland Revenue Department**

Researchers:

Warwick Anderson
Doctorate Student, Assistant Lecturer (occasional), Tutor
University of Canterbury
Christchurch

Adrian Sawyer
Senior Lecturer in Taxation and Business Law
Department of Accountancy, Finance and Information Systems
University of Canterbury
Christchurch

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Bob realized too late that he should have never taken a number.

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Terms of Reference

The Proposal

A proposal was submitted in response to a letter of 5 November 1996 from the Inland Revenue Department. The Department accepted the researchers' proposal formally on 2 April 1997, subject to the modifications that were negotiated, and which are detailed below.

The project involved a social science laboratory experiment to determine shifts in taxpayer risk profiles in accordance with theories of decision making under risk. The primary aim was to test Dusenbury's three hypotheses on New Zealand taxpayers. This involved setting a sample of New Zealand subjects tasks identical with those set by Dusenbury. This was made possible by Richard Dusenbury having forwarded his scenario scripts.

Extension Hypotheses

A secondary hypothesis to investigate the issue of *amount involved* stated in the wording of the IRD National Research Unit's first research topic was proposed. This was incorporated into the experiment but not as a separate hypothesis.

With respect to *attitude to tax*, a departure from the strict format of the Dusenbury experiment was suggested. Three short scenarios involving conflicting moral and ethical considerations along the lines of Rest's (1974) Defining Issues Test were to be constructed, which will elicit underlying ethical attitudes toward tax paying. It was subsequently decided that this aspect would make the experiment too long and cause participant fatigue. It was therefore dropped.

It was also proposed to carry out an investigation of the variable, *awareness of the tax system*. The researchers sought to ascertain how the National Research Unit intended to define this variable, and sought feedback on this point. Details were never received so this variable was not incorporated into the project.

Selection of Participants

As participation in a tax-related experiment is not the kind of thing which may easily be solicited via random selection, it was initially proposed to gather 180 participants in a manner similar to Dusenbury's, with some subtle changes.

Non-profit organisations will be approached for experimental subjects rather than recruits being approached directly by the researchers, with approximately 30 from each organisation. The participant's financial outcome will be given to the funding-hungry organisation to which he/she belongs. Each organisation would receive a minimum guaranteed donation from the researchers in return for contributing a specified number of participants; and this monetary amount may be increased by the net amount of 'earnings' achieved by these participants (but not decreased below this floor).

Participants would be selected in such a way that *business income* participants will be matched by *non-business* (We assume these terms have been intended as synonyms for *self-employed* and *employed by others*). This was because the IRD's National Research Unit has specified its interest in *source of income* as a variable.

Given that the sample must be as closely aligned as possible (to the extent that this is financially feasible to the nature of the populations of New Zealand *business* and *non-business* taxpayers, the following recruitment details are proposed:

- (1) Half of the participants (90 persons) will be recruited by organisations in a representative metropolitan area. This could be either Wellington or Auckland.
- (2) The other half of the participants will be recruited from two non-metropolitan centres. One of these must be in the South Island, and the other in the North Island. Areas such as Nelson or Invercargill, and in Hastings/Napier or some alternative North Island city such as Hamilton or Palmerston North at 45 recruits minimum per town. Selection of a North Island metropolitan centre and non-metropolitan centre would give the full sample a 75% weighting to North Island participants.

Changes to Terms of Reference

However, further changes were required. The researchers would carry out the project detailed in their proposal together with the mutually agreed modifications set out in e-mail correspondence dated 17 February 1997 and 12 March 1997. Essentially these changes were as follows:

1. The study will be restricted to Christchurch and Wellington.
2. Total participants will be about 60 from each region, drawn from a pool of about 300 potential respondents in each region. A member of the National Research Unit would identify potential participants for each pool. The researchers would contact pool members, and they will be asked to respond directly to the researchers.
3. The researchers will administer the experiment in Christchurch, and a member of the National Research Unit will work with the researchers to administer the experiment in Wellington.
4. Inland Revenue will receive a draft copy of the final report, and have the chance to discuss its content before the final version is printed.
5. Inland Revenue will receive at least one printed copy of the report, and an electronic file that gives Inland Revenue the ability to print further copies if required.
6. Inland Revenue has the right to add a disclaimer to any New Zealand-published matter that results from the research.
7. The final research report will be delivered to Inland Revenue before 31 August 1997.

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Summary of Costs and Grant Sought

After providing details of material, supervisor and other requirements, the costs were summarised as follows in the proposal:

Phoney money:	\$18
Envelopes:	\$23
Outcome Determination Chips:	\$40
Scripts & Questionnaires:	\$90
Telephone/fax:	\$250
Supervisors' costs	\$3,180
Travel/accommodation/venue hire for two researchers	\$6,080
Participants (assuming 180 participants.):	\$2,349
Total: (approx as a maximum)	\$12,030
	(Say, \$12,000)

With the change in the scope of the project, the costs needed to be reduced. Inland Revenue was prepared to fund the project by way of two grants. The first grant was paid when the project started in April 1997 (\$3,440), with the second (\$3,000) paid either when the first was exhausted, or satisfactory progress had been made. The second payment was made in June 1997 following submissions of a detailed progress report. The total grant was therefore \$6,440.

Monthly statements of disbursement are to be provided at the end of the project to enable the Head of the National Research Unit to account to Inland Revenue for the specific costs incurred. No additional funds were available for this project. If any funding difficulties should arise that affect the project output, a mutual agreement would be sought between the Department and the researchers.

Process for Resolving Disputes

If Inland Revenue disagreed with the researchers on any point of the research, or on its progress, the Head of the National Research Unit would negotiate with the researchers to resolve the issue. If this could not lead to a resolution, both parties would accept the decision of a mutually acceptable, independent third-party.

Extensions to Completion Date

Several extensions to the 31 August 1997 date for submitting the report were agreed to, following delays in implementing the experiment. In particular, it was agreed in February 1998 that with delays in receiving lists of taxpayers from the Department, and with problems in data provided and the need for a second Christchurch sample, the date for completing the draft of the report would be mid April 1998. Prior to this date the researchers indicated that a further delay was necessary due to the unavailability of the researchers during much of April 1998 to finalise the draft report. A draft report would now be provided by early to mid May 1998 and a final report produced when the Department communicates its acceptance of the draft report or provides details of changes it considers necessary.

Executive Summary

This project replicates and extends Dusenbury (1994). A 1995 non-random sample of 132 New Zealand taxpayer-participants and a 1997 -1998 random sample of 60 New Zealand taxpayers performed a laboratory experiment consisting of three decision problems relating to tax situations and two decision problems relating to other financial contexts.

The focus of interest was the power of each tax context's stated prepayment position to induce a decision frame (as predicted by *Prospect Theory*) capable of determining each participant's risk preferences. The use of a *repeated measures* analysis of variance procedure (general linear model) allowed for *within-subject* comparisons so that decision-frame-induced shifts in individual participants' risk preferences across decision problems could be diagnosed.

The study found, with respect to the tax problems, that the predictions of *Prospect Theory* and the findings of Dusenbury (1994) were generally supported. However, similar risk preference shifts based on alternative decision frames, independent of prepayment position and all other contextual information, were also detected.

When *within-subject* comparisons were also generated by contrasting tax and non-tax decision problems, identical apart from context, it was found that participants produced evidence of dissimilar, context-sensitive risk preferences. Risk preferences were also found to be stable for decision problems containing identical option sets and similar, but not identical contexts. Also, a significant behavioural difference was detected between participants with high cash floats and those with low cash floats; but there was no meaningful difference between the randomly selected and non-random samples of taxpayers.

The tests of Hypothesis H_{1A} produced very clear results. The alternative form of the hypothesis specified that participants would choose riskier options in the high pay case than in the refund case. The null form specified that there would be no significant difference between choices made in the two cases. When the 1997 - 1998 random sample was investigated in isolation, the null form of H_{1A} was strongly rejected at less than the one percent level of error. This finding was not contaminated

in any fashion, since statistical evaluation procedure produced no significant *between-subjects* effects, and no significant *within-subject* effects other than the CASE effect denoting the difference in levels of risky choice.

When the 1997 - 1998 sample was combined with the 1995 non-random sample, the null hypothesis was again rejected with an associated error of less than one percent. In this instance, however, evidence of a second significant *within-subjects* effect was produced by the statistical evaluation procedure. A CASE*FLOAT interaction effect was found to be significant at the 5 percent level of error. This indicates that the participants were influenced by the level of cash float given to them in the experiment. The smaller the size of this float, the more differences in risk preferences between decision problems tended to be magnified. However, no significant between-subjects effects were found.

The tests of Hypothesis H_{2A} did not produce clear results. The alternative form of this hypothesis specified that participants would choose less risky options in the health insurance case than in the high pay tax case. Both when the 1997 - 1998 random sample was investigated in isolation and when it was treated in combination with the 1995 non-random sample, H_{2A} 's null form could not be rejected. However, when the samples were partitioned in terms of participants' stated attitudes towards the New Zealand public health system and their related belief in the necessity of private health insurance, a different picture emerged. Each sample was partitioned into two subsamples: a 'those-in-favour-of-private-insurance' subsample and a 'those-against' subsample. This gave rise to four subsamples. In three subsamples out of the four, the null hypothesis of a modified version of H_{2A} could be rejected. This modified version of H_{2A} was that participants would choose a different level of risk from the level chosen when paying tax in the high pay tax case, when deciding upon health insurance. Depending on attitude to private health insurance, participants showed that they were either more risk averse when buying insurance than when pay in tax, or had risk preferences ordered in the opposite direction. In the fourth instance (the subsample of 1997 - 1998 random sample participants favouring private health insurance), the null form of H_{2A} could not be rejected.

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The tests of Hypothesis H_{3A} produced extremely clear results. The alternative form of the hypothesis specified that participants would choose riskier options in the gamble case than in the low pay tax case. The null form specified that there would be no significant difference between choices made in the two cases. When the 1997 - 1998 random sample was investigated in isolation, the null form of H_{3A} was strongly rejected at the one-hundredth of one percent level of error. The statistical procedure produced no further *within-subjects* effects and no between-subjects effects.

Acknowledgments

The researchers are indebted to the services of the supervisors used for the series of experiments in Christchurch during 1997-1998, including Patrick Clay, Jenni Mehrtens, Maryann Richardson and Jackie Russell-Green. We also acknowledge the assistance of Barry-Florence Bennett of the National Research Unit as our point of contact and provider of participant data as required.

1. Introduction

“Previous research has identified the end-of-year tax position (tax to pay, a refund due, or no liability), and the amount involved, as influencing factors in tax compliance. Possible mediating influences are the person’s attitude to tax, awareness of the tax system, and sources of income (e.g. business or non-business). The key issues here are whether all of these are valid factors, and how they combine, if at all, to influence tax compliance.”

IRD National Research Unit Communication November 1996

This laboratory experiment addresses all of the issues raised in the research question cited above, primarily in the context of Prospect Theory (Kahneman and Tversky 1979, Tversky and Kahneman 1992) and with respect to decision frames (Tversky and Kahneman 1981, 1986). The experiment entails a replication and extension of research undertaken by Richard Dusenbury in the United States of America and written up in the *Journal of the American Taxation Association* Vol. 16(1), Spring 1994.

One of the salient perceptions afforded by the experiment is that the confirmed existence of decision frame effects cuts across the prediction that people making risky decisions will make rational decisions. This is one of the key predictions made by the paradigmatic theory of decision making under risk — Expected Utility Theory (Von Neumann and Morgenstern 1947). In particular, a rational decision is defined as a choice based upon the expected value of the set of all possible outcomes over the range of courses of action available to the decision maker. Expected Utility Theory underpins Deterrence Theory research into non-compliant taxpayer behaviour.

The concept of decision frames relates to how a decision maker depicts a set of alternative possible courses of action associated with a given problem in need of a solution. Tversky and Kahneman (1981, p.453) coined the term:

“...[T]o refer to the decision-maker’s conception of the acts, outcomes, and contingencies associated with a particular choice.”

According to Prospect Theory, decision frames arise in the first of two phases decision makers pass through when they make choices entailing various degrees of risk. This initial phase is known as the coding phase (Kahneman and Tversky 1979,

p. 274), and is followed by a phase in which the available courses of action are evaluated. In the coding phase, individuals do not perceive their upcoming decision in terms of a final wealth position or holding, but in terms of a gain or loss in terms of a reference point. Kahneman and Tversky (1979, p. 274) state:

“...[T]he location of the reference point, and the consequent coding of outcomes as gains or losses can be affected by the (1) formulation of the offered prospects, and (2) by the expectations of the decision maker.”

The decision frame which informs a decision maker's adoption of a reference point may simply be a matter of wording in which a risk-bearing decision problem may be explained in either a negative or a positive light (an emotive manipulation of perceptions); or it may be a matter of the field of endeavour in which the decision is to be made. In the latter case, a decision problem relating to the furnishing of a tax return with terminal tax payable will be perceived and treated in quite a different light from a decision problem with an identical set of financial risks and returns, but relating to health insurance.

2. Prior Research

Perhaps overwhelmingly so, most of the prior research has been conducted in the United States of America on the US tax compliance phenomenon. While several Dutch and Australian-based studies are cited, the authors are unaware of any published compliance research conducted in the Prospect Theory paradigm into New Zealand tax compliance.

Prior to 1985, the main thrust of compliance research was conducted in the Expected Utility Theory paradigm; and models developed for compliance analysis within the paradigm have become known as Economic Deterrence models. Allingham and Sandmo (1972) developed one to show that increases in detection rates and penalties would improve the quality of income reporting. Further models were developed by Srinivasan (1973), and Weiss (1976). Cowell (1985) and Yaniv (1988) used Economic Deterrence models to show that reduction of prior tax withholdings tax was associated with increases in evasion. Further less model- or theory-specific commentary on the effect of tax withholdings was also provided by Wallschutzky (1984 and 1989), Jackson and Milleron (1986), and Milleron and Toy (1988).

Framing Effects and Taxpayer Risks when Filing Tax Returns

That economic deterrence model research conducted within the Expected Utility Theory paradigm did not provide universally satisfactory answers to all the questions relating to tax compliance decisions became increasingly apparent during the 1980s. A representative piece of research bearing this message was conducted by Baldry (1986). He contrasted results from a pair of experiments employing identical risk-payoff structures but which were garbed in dissimilar financial decision-making contexts. Baldry recognised that gambling and tax evasion were seen in two quite different lights by the participants, and noted that this bifurcation of perceptions could not be explained in Expected Utility Theory terms.

Carroll (1992) explored case-related differences in perceptions on a broader scale and both Carroll and Milleron and Toy (1988) argued that an alternative approach to compliance research, which took into account the emotions and biases of taxpayers was superior to the Economic Deterrence approach. This alternative approach has been termed the Fiscal Psychology approach.

A small number of US researchers have studied taxpayers' propensity for non-compliance within the Prospect Theory research programme — a programme which is seated within the ambit of Fiscal Psychology. To date, some of them have found that US taxpayers do exhibit risk profiles of the sort predicted by Prospect Theory, while others have failed to find any significant connection. The concept of decision frames in the compliance context was first used by Carroll (1989).

Jackson and Jones (1985) investigated the weighting function with respect to tax compliance and found that individuals did not distinguish accurately between very small amounts of detection risk and that their decision weights were influenced by the dollar amount of the penalty tax. This finding implied that the size of a tax penalty has a greater evasion deterrence effect than does the perceived probability of detection.

Chang, Nichols and Schulz (1987) investigated whether the Prospect Theory value function was more appropriate to tax compliance than the utility function of Expected Utility Theory. They noted that the utility function was limited to being a function of income or wealth states whereas Prospect Theory's value function allowed them to distinguish between perceptions of tax payments as reduced gains and tax payments

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as losses . Chang et al's findings did not show any significant shift in their subjects' risk profiles overall. However, Chang et al's scenarios elicited yes/no answers, and thus were perhaps insufficiently sophisticated as diagnostic tools.

Further work was done by Hite, Jackson and Spicer (1988), Robben, Webley, Elffers and Hessing (1988, 1990), Robben, Webley, Weigel, Warneryd, Kinsey, Hessing, Alvira Martin, Elffers, Wahlund, Van Langenhove, Long and Scholz (1990), and Webley, Robben, Elffers and Hessing (1991). Hite et al, however, abandoned their working paper on the ground that its research technique was too simplistic.

Cox and Plumley (1988) furnished evidence of a framing effect based on prior tax withholdings from data 1982 provided by the IRS' TCMP Survey of Individual Returns. The sample in this instance consisted of 50,000 American tax returns for the year. The raw data used by Cox and Plumley was also made available to Chang and Schultz (1990), who independently and unwittingly corroborated their findings, which had initially been an in-house report for the IRS.

Schadewald (1989) manipulated the level of prepaid provisional tax and hence the decision frame taxpayers might use in the editing phase of their prospects regarding tax compliance. He failed to find a significant reversal of risk behaviour between frames offering prospects of gains and frames offering prospects of loss. Schadewald's result was challenged by Schisler (1992, p. 50) on the ground that Schadewald used the terms 'overwithheld' and 'underwithheld' for the manipulation of his subjects in his gain and loss scenarios. Naive taxpayers may have failed to make the connection between 'overwithheld' and gain, and between 'underwithheld' and loss. Schadewald was also criticised for the relative insignificance in size of refunds available and further tax due — a factor which may also have contributed to the statistical insignificance of any decision frame effect.

Schisler (1992) also hypothesized that taxpayers in a refund situation will be more risk averse; whereas, taxpayers in a large tax due situation will be more risk seeking. He found that his subjects were significantly more aggressive in their risk profiles when in tax loss situations, and that taxpayers did indeed exhibit risk preference in accordance with the value function of Prospect Theory. This finding was supported by similar findings by White, Harrison and Harrell (1993). Both Schisler and White

et al used MBA students as a proxy for taxpayers. White et al also used accountancy undergraduate students as well. But neither Schisler nor White et al compared students with non-student adult taxpayers in order to establish whether or not students are valid experimental subjects for tax compliance research.

Unlike Schadewald, Schepanski and Kelsey (1990) did find a significant decision frame effect. Schepanski and Kelsey investigated alternative decision frames and the shape of the value function exhibited by taxpayers who had paid varying amounts of provisional tax. Three situations were set up — a tax loss situation, a tax refund situation, and a situation in which emphasis was put on a final wealth position. In accordance with Prospect Theory, they found their subjects chose riskier tax return-filing options when they perceived their decision frame as involving prospects of loss. However, Schepanski and Kelsey's method confounded the effects of decision frames with an extraneous variable — differences from expectation. However, Schepanski and Shearer (1995) found that taxpayers base the neutral reference point of their decision frames on a current asset position rather than an expected asset position.

In another study cross-checking and extending Schadewald's (1989), Martinez-Vasquez, Harwood and Larkins (1992) tested the validity of prior withholdings-based decision frames in a set of experiments. They found that experimental subjects (and by extension, taxpayers) do not think in terms of a gain or loss measured from a neutral reference point determined by prepayments unless the gains or losses are explicitly labelled. Martinez-Vasquez et al also examined the impact of a liquidity variable on taxpayer behaviour given expected and unexpected terminal tax balances due as a result of the nature of prior withholdings. A further variable investigated by Martinez-Vasquez et al was a fiscal illusion variable which coded whether tax payments had to be paid as a lump sum or were payable in instalments. The variable was found to be of little significance with respect to subjects' propensities to evade.

Dusenbury (1994) found that US taxpayers do indeed have risk profiles of the sort predicted by Prospect Theory, and that decision makers edit financial problems by means of decision frames. Anderson (1996) replicated and extended Dusenbury's work, using a sample of 132 taxpayers in Christchurch, New Zealand. His findings supported those of the North American study and showed that the risk preferences of

participants were sensitive to the level of cash float provided in the experiment. Since the current project also is a conceptual replication of Dusenbury's work, Dusenbury (1994) is commented on in greater depth in the next section.

Decision frame-related research has also been conducted in the area of the professional behaviour of tax preparation specialists by Sanders and Wyndelts (1989) and Schisler (1992, 1995).

A further discussion of the literature may be found in Anderson (1996) and in the research proposal.

3. The Object of the Replication: Dusenbury (1994)

3.1 Dusenbury's Format and Hypotheses

Dusenbury (1994) investigated the decision frame phenomenon with respect to tax withholdings from a subtly different angle from those of earlier studies; but first it would be useful to provide an overview. In common with the experimental style of White, Harrison and Harrell (1993) and Schepanski and Kelsey (1990), Dusenbury held the level of income, tax rates and tax liability constant over three terminal tax-filing scenarios. He adopted this approach in order to investigate if shifts among different levels of provisional tax withholdings would be absorbed by participants as meaningful shifts of decision frame, with concomitant switches between risk aversion and risk willingness.

It is important to note that Dusenbury set out to eliminate all possible alternative frames of reference so that participants in his experiment would potentially be influenced by one frame alone — the frame produced by the level of prior tax withholdings.¹ His three tax scenarios were labelled for convenience:

- (i) the low pay case in which, depending on what option the participant chose, a relatively small amount of tax had to be paid or even a refund claimed;
- (ii) the high pay case in which all the possible levels of reported income required payments of terminal tax; and

(iii) the refund case in which all the options involved refunds.

In the refund and high pay tax cases, Dusenbury provided an unspecified item of income for which the tax treatment of associated expenses was in doubt. If a participant chose totally to ignore these expenses in filing his or her tax return, he or she would receive (in the refund case) a relatively low, but safe, refund, unchallenged by the tax authorities. If it was the high pay case, he or she would have to pay the largest stated terminal tax payment — again unchallenged by the tax authorities. However, the expenses associated with the earning of the unspecified income item were implied to be not insubstantial; and in his training script, Dusenbury told his participants that, in choosing such a course of action (Option **A**, the riskless option), they might be paying too much tax.²

The alternative risky prospects involved claiming an expense deduction on the unspecified income item which, from Option **B** to Option **E**, became an increasingly larger proportion of the size of the unspecified income item itself. Also, with the increase in size of deduction claimed, there was a concomitant increase in the likelihood of a challenge from the tax authorities. The challenge risk rose from a 15 percent probability in Option **B** to 40 percent in Option **E**. This information was summarised for participants in a table at the foot of each scenario. For convenience, the tables for the high pay case and the refund case are reproduced here as Table 1 and Table 2. The full experimental instrument for the 1997-1998 experiment is reproduced in Part C of Appendix 1.

Table 1: Summary Table Provided for High Pay Tax Case X.

¹ Dusenbury, R., (1994), “The Effect of Prepayment Position on Individual Taxpayers’ Preferences for Risky Tax-Filing Options”, p. 2.

² Dusenbury’s sample case instructions contained this wording: “In Option A you include the total earnings. There is no risk of under-reporting your tax (though you may be overpaying).”

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TAX FILING OPTIONS -- Circle One					
	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
PAYMENT DUE	PAYMENT	PAYMENT	PAYMENT	PAYMENT	PAYMENT
	\$800	\$700	\$600	\$500	\$400
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

Table 2: Summary Table Provided for *Refund* Tax Case Y.

TAX FILING OPTIONS -- Circle One					
	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
REFUND CLAIMED	REFUND	REFUND	REFUND	REFUND	REFUND
	\$400	\$500	\$600	\$700	\$800
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

Given the above summary information, a constant level of income at \$27,780, a level of withheld tax in the high pay case of \$4,200, and a level of withheld tax in the refund case of \$5,400, Dusenbury's first hypothesis was as follows:

H_{1A}: *Participants will choose riskier options in the high pay case than in the refund case.*

A vital aspect of Dusenbury's work was that he conducted both within-subject and between-subject testing. The within-subject approach allowed shifts of risk preference within an individual to be mapped. This was a distinct advance upon simple comparison of group means, and meant it was not necessary, as in Schepanski and Kelsey, to split the participants into mutually exclusive streams, each facing a different condition.

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A logical consequence of within-subject testing was the requirement that the decision problems had to be directly comparable with each other. Dusenbury achieved inter-scenario comparability by jettisoning the use of identical expected values across the set of five prospects within a scenario in favour of establishing uniformity of expected values across equivalent prospects in the set of three scenarios (refer Table 3 below):

Table 3: Construction of Tax Cases in Dollars.

Cases	Option A	Option B	Option C	Option D	Option E
Panel A: The Cases as Linear Transformations[†]					
HIGH PAY	(-800, 1.0; 0, 0)	(-700, 1.0; -400, 0.15)	(-600, 1.0; -500, 0.25)	(-500, 1.0; -600, 0.33)	(-400, 1.0; -700, 0.40)
Shift	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>
LOW PAY	(-200, 1.0; 0, 0)	(-100, 1.0; -400, 0.15)	(0, 1.0; -500, 0.25)	(100, 1.0; -600, 0.33)	(200, 1.0; -700, 0.40)
Shift	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>	<u>+(600, 1.0)</u>
REFUND	(400, 1.0; 0, 0)	(500, 1.0; -400, 0.15)	(600, 1.0; -500, 0.25)	(700, 1.0; -600, 0.33)	(800, 1.0; -700, 0.40)
Panel B: Expected Values[‡]					
HIGH PAY	-800	-757	-725	-699	-680
LOW PAY	-200	-157	-125	-99	-80
REFUND	400	443	475	499	520
Panel C: Variances^{††}					
ALL CASES	0	20,400	46,875	80,000	117,600
[†] In Panel A, the options are stated in the form $(x, p; y, q)$ where: x = payment due or refund associated with the taxable income reported, p = 1.0, (probability of the pay due or refund per reported taxable income), y = total cost of a subsequently detected understatement, q = the probability of a subsequently detected understatement.					
[‡] Expected value for any option $(x, p; y, q) = (xp) + (yq)$. Example: the expected value for High Pay, Option C is: $[-600 \times 1.0] + [-500 \times 0.25] = -600 - 125 = -725$.					
^{††} Variances are $(y^2q) - (yq)^2$. Example: the variance for Option B in all levels is: $[-400^2 \times 0.15] - [-400 \times 0.15]^2 = 24,000 - 3600 = 20,400$. ³					

This approach meant that the five prospects in each scenario contained unequal expected values, increasing progressively from option **A**, which was riskless, to the riskiest option, option **E**. The outcomes of each prospect and their associated probabilities are formally laid out in Panel A of Table 3. Note also in Table 3 that the initial choice made by a participant is associated with a probability of 1.0. This

³ Dusenbury is using a variance formula which is the binomial formula for variance multiplied by a factor of y . The standard deviation of a binomial distribution, according to Ott, L. and Mendenhall, W., (1985), *Understanding Statistics* (Fourth

simply records the fact that the initial outcome, (x, p) is absolutely certain. However there is a delayed second part to the prospect, (y, q) representing the tax authority's decision to challenge or not to challenge the return. The expected value of each option is shown in Panel B of Table 3.

With reference to the axiomatic invariance of preference orderings to positive linear transformations according to Expected Utility Theory (Luce and Raiffa, 1967, p. 30), Dusenbury made the point (Dusenbury, 1994, p. 7):

It is important to understand the selection of a different option in any two cases constitutes a preference reversal.

Comparability of Dusenbury's scenarios was facilitated by making the expected values of each option **A** constant across all scenarios (and then **B** and so on); and then he disguised the equivalence by shifting the **A-to-E** set in each scenario by an increment of \$600. Since this was an additive linear transformation, the variance of each option was preserved across the spectrum of scenarios. This is shown succinctly in Panels B and C of Table 3. Dusenbury enlarged upon the significance of making each scenario's options the linear transformation of the options in the other scenarios (Dusenbury, 1994, pp. 7 - 8):

The proof that preferring option C in the high pay case and option B in the refund case is inconsistent with expected utility theory depends on the existence of a functional representation of preference orderings. Let a greater than (>), or less than (<), symbol indicate preference. From the perspective of functional representation, if option C (high pay) > option B (high pay), but option C (high pay) + \$1,200 < option B (high pay) + \$1,200, then the slope of the function describing the preference ordering has changed signs due to the addition of a constant term. However, the slope of a function is unaffected by adding a constant term.

While Dusenbury provided three tax scenarios, he restricted his first hypothesis to consideration of the high pay and refund cases only. The reason for dropping the low pay case from consideration was that it was a mixed lottery which bridged the neutral reference point in the value function. This meant there would be no obtainable

Edition), p. 143, is $\sigma = \sqrt{yq(1-q)}$. Therefore the variance of the distribution will be $[yq(1-q)] = yq - yq^2$. By this formula the variance of the absolute value of the costs of the options are as follows: (B) = 51, (C) = 93.75, (D) = 132.66, (E) = 168.

meaningful result if the slope of the function describing ordinal preferences in this case was compared with those of preference functions associated with the other two cases, neither of which bridged the neutral reference point (Dusenbury, 1994, p. 9).

Dusenbury also provided two non-tax scenarios in order to test framing effects further by altering the decision setting. One of these was a medical insurance case, chosen because the purchase of this kind of insurance involves a decision context known for risk aversion. The funds flow and the risks and payoffs in this case were identical with those of the high pay tax case. This gave rise to the second hypothesis:

H_{2A}: *Participants will choose less risky options in the health insurance case than in the high pay tax case.*

In effect, the question asked in **H_{2A}** was: given that a framing effect existed with respect to the level of withholdings in the high pay tax case, could this framing effect be distinguished from that of a frame founded upon future money worries concerning future possible medical crises?

The second non-tax scenario was chosen for its association with risk-taking behaviours. It was a virtually contextless set of five gambling options, reminiscent of the two-prospect problems investigated by Kahneman and Tversky (1979), matching option for option, the risk and payoff combinations offered in the low pay tax case. Effectively, Dusenbury set up a Prospect Theory paradigm approximation of Baldry's (1986) experiment. The third hypothesis therefore was:

H_{3A}: *Participants will select riskier options in the gamble case than in the low pay tax case.*

3.2 Dusenbury's Subjects

Dusenbury used 65 non-randomly selected participants in 5 groupings. One of these groupings consisted of eight members of a support group of an athletics team; another were ten supporters of a school band; the third were fourteen parents recruited from a group attending a university freshman orientation programme; the fourth and largest were twenty-two summer school attendees; and the fifth grouping were eleven members of a church congregation.

What all these people had in common was that they were at least 30 years of age and had had more than two years' experience of full employment. The anonymity of all participants was promised and respected.

3.3 The Experimental Procedure

Each participant was given a training script with one scenario on it for familiarization, and a package containing a set of scenarios, pseudo money (stock cards) to the value of \$3,000 in \$100 notes, and an envelope in which to post payments made during the session. The first few minutes were given over to an oral introduction delivered by Dusenbury himself, or some other person in charge of the session; and in this time, participants could ask any questions they had about what was required of them.

When the experimental session began in earnest, the participants opened envelopes containing each of the five scenarios printed on a separate sheet. The order of progression was prescribed for every participant. To prevent the receipt of a refund by one participant having an influence on the choices of others in the session, everyone was required to do the refund tax case first. The remaining four scenarios were ordered in four different ways so that each choice appeared in each position once. Apart for the handing out of refunds requested, all outcomes were put on hold till all decisions on all scenarios had been recorded (unseen by others) on the scenario sheets and returned to each participant's envelope. According to Dusenbury, this overcame the problem of possible decision contamination. He noted (at p. 10):

Because the resolution of each outcome was not decided until all choices were made, choices were not affected by outcomes.

The purpose of this secretiveness was to achieve the condition of privacy, which is one of four preconditions laid out by Smith (1987, p. 248) for a well-conducted economic laboratory experiment:

This precept is used to provide control over interpersonal utilities (payoff externalities). Real people may experience negative or positive utilities from the rewards of others, and to the extent that this occurs we lose control over induced demand, supply and preference functions.

Dusenbury made sure that privacy was maintained by providing a minimum of one supervisor for every three participants. This also had the effect of streamlining the experimental procedure since any difficulties experienced by participants could be seen to very quickly.

Once a participant had worked through all five scenarios, he or she was required to spin a random outcome generating device, known as a spinner, to determine an outcome for every risky prospect chosen. The spinner selected outcomes in accordance with their probabilities (p). If the spinner's needle recorded an unfavourable result (to the participant), he/she was required to pay the penalty stated in the chosen prospect. Hence all penalty payments were paid by participants at the end of the session.

3.4 Monetary Incentive

At the start of their laboratory session, participants were given a fund of \$3000 in pseudo \$100 bills with which to make payments in accordance with the decisions they made in the five scenarios. They were told during the introductory briefing they would receive a real cash payoff of \$US0.50 for every \$100 of pseudo money they still controlled, after the outcomes to any risky decisions had been determined. This would occur at the end of the fifth scenario by a random outcome generator — in this case, the spinning of the spinner.

The purpose of the incentive was twofold. In the first instance, the handling of the experimental paper money (pseudo money) would render the scenarios and the business of paying tax and receiving refunds more tangible to the participants; and in the second, they would be encouraged, by the possibility of real gains to themselves, to take the decision problems seriously rather than dismissing them as some kind of game or other abstraction unrelated to actual financial decision-making. Dusenbury's aim was to make the tax-filing activity in the experiment as real as possible to the subjects. If they paid close attention to the details provided in the scenarios and made

careful and considered decisions on the basis of that information, then the experiment could be said to have external validity.⁴

Dusenbury's achievement of external validity was testable in terms of the results associated with testing his second and third hypotheses. He noted that if his design and procedures induced responses lacking in external validity, then participants would exhibit identical preferences in lotteries which were structurally identical.⁵ But, as recorded above, Dusenbury did not find this to be the case.

3.5 Dusenbury's Questionnaire

Dusenbury also required his participants to answer a debriefing questionnaire. In this, information was gathered on a number of variables relevant to the tax scenario decisions. These variables included participants' tax filing experience in years, their self-reported non-compliance, participants' attitudes towards taxpaying, the frequency of participants' tax-due and payment-due tax filings, and their perceptions of actual tax audit risks (Dusenbury, 1994, p. 13).

3.6 Dusenbury's Results

Although both repeated-measure ANOVA and MANOVA tests enabled Dusenbury to reject all three hypotheses, he reported only the ANOVA statistics:

1. Taxpayers, operating within a decision framework in which the level of prepaid provisional tax was low enough for all options to be seen as loss prospects, were significantly more risk-willing than the same taxpayers operating within a decision framework in which there was a perception of choices among gain prospects ($p = 0.01$).

⁴ The use of the \$0.50 per \$100 incentive met Smith's (1987) requirements for salience (a clear connection between act and outcome, and between outcome and reward) and dominance (the reward to the participant outweighs the participant's costs in terms of time and effort complying with the experimental requirements). See Smith (1987 p. 248).

⁵ See Dusenbury (1994, p. 7), footnote 7, which states: "The context contrasts also provide evidence regarding the influence of the experimental procedures on the participants' choices. The experimental design and procedures include highly structured lotteries, experimental funds, and resolution of uncertainty via a spinner. If the design and procedures induce responses lacking external validity (i.e., if subjects attend only to the incentive scheme and ignore the decision context), then participants should have the same preferences in structurally identical lotteries. The gamble case and low pay case are structurally identical as are the health insurance case and high pay case."

2. The mean riskiness of prospects chosen in the high payout tax scenario was significantly higher than in the health insurance case ($p = 0.01$). This possibly indicated the existence behind the surface of the decision frame of an ideology stressing a greater degree of concern for family physical welfare than on one's obligation to the state.⁶
3. The mean riskiness of prospects chosen in the gamble case was significantly higher than in the low pay tax case ($p = 0.0001$).

When Dusenbury conducted an analysis of his laboratory experiment results in conjunction with variables about which information was solicited in his debriefing questionnaire, he found that only one of these variables had a significant relationship with options selected in the tax scenarios. This variable was tax filing experience in years. Taxpayers with more filing experience were found to prefer riskier filing positions than less experienced taxpayers in both the high terminal tax bill and refund cases.

4. Method of the New Zealand Replication

The prime purpose of the replication is to provide a cross-cultural comparison between North American and New Zealand taxpayers with respect to their risk preferences when preparing to file their tax returns. It is noted that changes to the current study's experimental instrument make the replication a conceptual replication rather than a pure one.

4.1 The New Zealand Experimental Arrangements

In terms of formatting and supervision, the 1995 and 1997 - 1998 New Zealand experiments followed Dusenbury's arrangements closely. Participants were taken through a training schedule based on Dusenbury's before they were given the experimental instrument; and there was a minimum of one supervisor for every three participants. Because it was often impossible to schedule participants into well-attended sessions, it was necessary to run sessions for as few as one attendee on a number of occasions. However, this should not give rise to any confounding factors

⁶ Dusenbury does not state this, but it is implicit in his hypothesis.

on the ground that the study concentrates on within-subject shifts in risk levels; and all sessions followed the standard format.

Participants were encouraged to ask clarification questions of the supervisors on any aspect of decision problems at any time; but were not permitted to communicate among themselves. Tea and coffee were provided in order to relax participants with respect to the university tutorial room environment and the supervisors while they worked through the problems.

Where Dusenbury used a spinner to compute outcomes at the end of the experiment, the researchers used a bag of plastic board game chips numbered from 1 to 100. A participant was required to draw one chip from a bag of 100 for every risky choice made; and at this point the participant's residual cash float was adjusted in the light of any unfavourable outcomes. The participant finished his or her session by filling out the questionnaire. As in Dusenbury's North American experiment, the anonymity of all participants was promised and has been respected.

4.2 The New Zealand Instruments

The New Zealand decision problems were adaptations of Dusenbury's scenarios to render them user-friendly to New Zealand participants. While the risk and return sets were left unchanged, the story-lines and the wording in which they were couched were altered significantly. The New Zealand instrument used in 1997 -1998 is provided in Appendix 1 (Part C) along with the training script (also significantly reworded - see Part B of Appendix 1) and disclosure documents that the University of Canterbury Human Ethics Committee required the researchers give to the participants (Appendix 1, Parts A - G).

The 1997 - 1998 instrument was modified from the 1995 instrument by the dropping of two extension decision problems to return to Dusenbury's sizing of five; and replacing the income figures given in the story-lines of the three tax cases in order to bring the scenarios into line with the new first tier tax rate of 21½ cents in the dollar. The old income figures had been designed to reflect tax rates of 24 cents in the dollar up to \$30,875 and 33 cents per dollar of income above that ceiling. The High Pay Tax Case X income figure was also reduced to bring it back in line with the

magnitude of the income figures of the other two tax cases. Not one of these adjustments produced material differences between the 1997 - 1998 participants' behaviour and that of the 1995 participants. The three 1995 tax scenarios are included in Appendix 1 (Part G).

There were a number of other differences from Dusenbury's study which went beyond mere rescheduling of the wording. The monetary incentive was reduced to 30 cents per \$100 of pseudo-money participants controlled at the end of the experiment; and in the 1995 New Zealand replication, a significant extension was added in terms of the nature of participant recruitment.

4.3 The Recruitment of the New Zealand Samples

In the 1995 experiment, 132 volunteers were marshalled by four organisations which pocketed all of the participants' experimental earnings along with a fairly large down payment (called a donation), which was made in order to make the marshalling effort a worthwhile fund-raising activity. The four organisations were an Anglican church, a kindergarten parent/teacher group, a primary school parent/teacher group and a social club associated with a postgraduate course (not in the commercial area) at Lincoln University.

Because each organisation received a guaranteed donation roughly equating with NZ\$10 per participant marshalled, the participants themselves could be put into a much tighter experimental situation than Dusenbury allowed, in two respects. In the first instance, participants were told that if they ended up with a deficit at the end of the experiment, they would reduce the earnings owed to their organisation by the amount of that deficit. This put them under greater pressure to treat the decision problems in a serious manner while the organisation would receive its guaranteed donation plus any net gain over and above that.

In the second instance, the recruitment via fund-hungry organisations enabled the researchers to vary the level of monetary float each participant received. It was posited that a lower cash float would make participants more budget-conscious.

Also included in the 1995 experiment were a number of extensions which were not carried over into the 1997 - 1998 experiment. The results of the 1995 experiment are

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not specifically reported in the current report; but the data collected from the 1995 year participants has been collated along with the 1997 - 1998 data in a set of results on a sample called 'the combined sample'. Given that it was determined the 132 participants of the 1995 experiment conformed quite closely in their characteristics to the demographic statistics for Christchurch region in terms of the 1991 New Zealand Census of Population and Dwellings, the combined sample may shed some light on the representational faithfulness of the random sample. One would expect that the determination of representational faithfulness would be the other way round; but the very low response rate associated with the 1997 - 1998 random sample did not make this feasible.

The salient difference between the 1995 New Zealand experiment and the 1997- 1998 replication was that the latter's participants were a random sample. This fact entailed returning to Dusenbury's (1994) monetary float arrangements. One float was given to all participants (\$2100), and those who were unlucky enough to end the experiment with a pseudo money deficit were not required to pay their debt. Furthermore, the random sample participants were asked whether they wanted to keep their earnings or require the researchers to hand it on to a charity. This question measured whether a participant was altruistic or not. (All 1995 volunteers were deemed to have been altruistic by virtue of the method of recruitment.)

Initially the researchers intended to compare a sample of 60 or more Christchurch taxpayers with a sample of taxpayers from another metropolitan area, Wellington. The Inland Revenue Department agreed to provide a list of 300 names and addresses for each city, randomly generated from its taxpayer database. The number of participants recruited from these lists was a disappointing low figure. The Inland Revenue was persuaded to furnish a second list of 300 Christchurch taxpayer names and addresses; and from the three lists the researchers were able to recruit exactly 60 participants, only 12 of whom were Wellingtonians. The recruitment data is recorded in Table 4, and the documentation soliciting involvement in the experiment may be found in Appendix 2.

Table 4: Breakdown of Random Sample Recruitment

	Samples			Total
	Christchurch 1	Christchurch 2	Wellington ¹	

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List Size	300	305	303	908
Less Gone No Address/Overseas ²	16	22	55	93
Less Children (8 & 11 years old)	1	1		2
Less Deceased ³	7	1	1	9
Net List Size	276	281	247	804
Refusal Notifications ⁴	33	94	63	190
Recruits who participated	23	25	12	60
Responses as % of Net Sample	20.29%	42.35%	30.36%	31.09%
Recruits as % of Net Sample	8.33%	8.90%	4.86%	7.46%

¹ The random selection included one rogue Auckland address in this Wellington list, which has been counted in the gross list and treated as a 'Gone No Address' item.

² This category covers people living (as distinct from holidaying) overseas, but also includes a small number of people who have moved elsewhere in New Zealand who have had their mail forwarded from their old address.

³ The range of time lapses since death were from within a year to 20 years. Several of the deaths occurred 13 years ago.

⁴ Refusal notifications often tended to include messages of support for the experiment and some form of comment which could be interpreted as a willingness to participate had the times or their personal circumstances had been different. The notifications associated with the Christchurch 1 sample are much lower than the other two notification figures because the format of the response form did not initially contain a tick box for indicating a refusal. This meant that a number of non-participants who might have communicated their refusal will have assumed that the response form was only to be mailed to the researchers where they wished to participate.

Given the extremely low participation rate, the intention to compare responses from the two metropolitan centres was abandoned. Instead, it was decided to coalesce the raw results from the random sample with those from the four 1995 Christchurch participant groupings and analyse the data both in terms of a combined sample and in terms of the 1997 - 1998 random sample alone. The stand-alone results of the 1995 experiment are available in Anderson (1996).

4.4 Response Variables and Categorical Variables

Given that the study is concerned with within-subjects shifts in risk preferences as measured by differences existing among the means of response variables, a categorical variable is a variable which may have an influence on those differences. A response variable is simply the data set of responses made by participants to a decision problem. It is the record of each participants risky (or riskless) choice. Since there were five decision problems, there were five response variables (also known as dependent variables). The response variables are identified in two manners, as shown in Table 5:

Table 5: Response Variables

Refund Tax Case Y	CASEY
High Pay Tax Case X	CASEX
Low Pay Tax Case Z	CASEZ
Health Insurance Case	CASEM (M for 'Medical')
Gamble Case	GAMBLE

The three primary categorical variables employed in the study are GROUP, ORDER and FLOAT. They are primary because they represent phenomena which were determined either by the researchers (ORDER and FLOAT) or by the recruitment arrangements of the experiment (GROUP). The twenty items canvassed in the questionnaire and the two items requesting disclosure of how importantly participants weighted consideration of the story-lines in the refund and high pay tax scenarios constituted further categorical variables relating to the participants' inherent characteristics. While combinations of the primary categorical variables were used in all hypothesis testing, each of the questionnaire variables was deployed in the statistical analysis to check for the existence of significant associations between participants' characteristics and their risk preferences in the experiment.

The first categorical variable was GROUP. The four organisations providing volunteers in the 1995 experiment constituted the first four levels of the variable; and the three random samples (two from Christchurch and one from Wellington) made up the fifth, sixth and seventh level. A significant GROUP effect discovered in the analysis would indicate that participants from different sources behaved in different manners. Differences of this sort, especially if unexplained, would reduce the researchers' ability to explain risk shifts in terms of the posited decision frames.

The second categorical variable is ORDER. As in the case of GROUP, a significant ORDER effect would diminish the power of any argument for the existence of decision framing — unless it could be satisfactorily explained — since the stronger the impact of case ordering, the less likely it would be that a predictable risk shift between any two response variables could be confirmed.

One of the salient differences between Dusenbury's (1994) experimental design and the design in this study lay in the number of case orderings. Dusenbury restricted his case orderings to a total of four, which effectively was also the number of subsamples in his analysis step; and so he had a balanced design suitable for a *repeated measures* ANOVA. The current study, in contrast, employed a random spread of case orderings for the replication scenarios (with the exception that *refund* Case Y, as in Dusenbury's experiment, always came first). Because only 19 of the 24 possible permutations were actually used, and also because this number was quite incongruent

with the number of subsamples (four as determined by recruitment) and the number of sessions, the current study had an unbalanced design. The downside of this was that it was not possible to use Dusenbury's exact computational procedure in the analysis of the data.

However, there was an up-side to this approach. The experimental conditions more closely mimicked the random ordering of actual decision problems in daily life. Furthermore, powerful computational tools are available for the handling analysis of variance for unbalanced designs; and in particular, this study made use of a General Linear Model (GLM) analysis of variance procedure, one of which, like Dusenbury's (1994) ANOVA tool, involved a *repeated measures* function.

The third core categorical variable employed in the statistical analysis was FLOAT. It is to be noted that three different levels of cash float were used in the 1995 experiment — \$4200, \$3,500 and a low float of \$2100 — while only the \$2100 level was used in the 1997 - 1998 experiment. While the 1995 experiment involved two more decision problems than did the 1997 - 1998 experiment, these extra two had the effect of cancelling each other out, as one entailed a refund while the other required participants to make a payout of a similar order. Therefore it could be argued that the impact of the \$2100 float level would be the same in the two experiments. This assumption was tested by means of SAS's *NPARIWAY* tool, a nonparametric testing procedure which performed the *k*-sample Brown-Mood median test and the Kruskal-Wallis test. Where the assumption was borne out, all \$2100 floats were coded in the same manner, which meant that FLOAT was a variable with three ordinal values. However, where the impacts were different, they were coded as separate \$2100 floats, and the ordinal values of FLOAT ranged from 1 to 4.

5. Results

5.1 Overview

The New Zealand results, both in terms of the combined sample and the 1997 - 1998 random sample, were similar in nature to those of Dusenbury (1994). The null from of hypotheses H_{1A} and H_{3A} were strongly rejected. However, the New Zealand experiments conducted two years apart, both failed to record a rejection of the null form of H_{2A} .

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The remainder of this section is laid out as follows. The initial overview portion of the section explains how the results are laid out in tabular form and provides a synopsis of the information relating to the behaviour of the means of the five response variables. The validation testing procedure is then discussed; and this is followed by contemplation in depth of the results pertaining to each of the hypotheses in turn.

The salient feature of H_{1A} , H_{2A} and H_{3A} is that each hypothesis entails a comparison of responses made to a pair of decision problems offering choices amongst risky prospects. The most immediately accessible parameter for making this comparison is the mean of the risk-related choices recorded in response to the two problems. Two computations of this mean are possible. Since every decision problem contained five prospects (labelled Options **A** to **E**) laid out in order of increasing riskiness, it was possible to convert them into a five-point ordinal scale in which **A** equated with **1** and **E** equated with **5**. This enabled numerical means to be calculated such that a mean of 2.5 could be interpreted as representing a higher average level of risk willingness in the minds of the participants than a mean of 2.3. This type of mean was reported in the results of the statistical analysis and is included in each of the ANOVA tables in Appendix 3 (Part A).

The second approach to computing means involved summing the chosen risk levels as decimal fractions and dividing by the number of decision makers. This produced a mean level of preferred risk, which could be read as a defined probability or converted into a percentage level of chance. This formulation of mean allows for an immediate comparison with the stated levels of risk participants faced when working through the experiment's five decision problems. The means of the five response variables are reproduced in Table 6 below, along with a preliminary view, in Panel B, of what they imply in terms of the three hypotheses:

Table 6: Subjects' Choices: Descriptive Statistics.

PANEL A: The Mean Risk Level Selected				
Sample Size	Combined Years		1997/8 Random Sample	
	N = 192		N = 60	
Cases	Mean	St. Deviation	Mean	St. Deviation
<i>Refund</i> Tax Case Y	16%	12%	15%	12%
<i>High pay</i> Tax Case X	22%	12%	23%	12%
<i>Low pay</i> Tax Case Z	15%	12%	16%	12%
Health Insurance Case	19%	13%	23%	12%

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Gamble Case	26%	14%	27%	14%
PANEL B Preliminary Support for the Replication Hypotheses¹				
Sample Size	Combined Years N = 192		1997/8 Random Sample N = 60	
Hypothesis (And Constituent Cases)	Mean Risk Shift	Support for Rejection of H₀	Mean Risk Shift	Support for Rejection of H₀
H_{1A} (Tax Cases X and Y)	6%	YES	7%	YES
H_{2A} (Tax Case X and Health Case)	3%	YES	- 1%	NO
H_{3A} (Gamble Case and Tax Case Z)	11%	YES	11%	YES
¹ These risk shift percentages are the means of the set of differences between each pair of observations for the two cases, i.e., X minus Y, X minus the Health Insurance Case, and the Gamble Case minus Z.				

The null forms of hypotheses **H_{1A}** and **H_{3A}** are rejected quite firmly in Table 6; but the results for **H_{2A}** are mixed. This apparent support, in three instances out of six, for the rejection of the null forms of the three hypotheses is summarised in terms of the risk preference shifts. A mean risk preference shift is defined here as the difference between the means of the risk levels chosen in the pair of decision problems examined when testing each hypothesis. It must be noted, however, that this summary information is preliminary evidence only, which, as yet, has not been subjected to tests for statistical significance.

Formal testing for statistical significance involved the use of the variance parameter. The vehicle for most of the statistical analysis undertaken in the study was a SAS *repeated measures* General Linear Model (GLM) analysis of variance procedure. The *F*-statistics furnished by this procedure indicate whether or not there are significant differences in the risk levels chosen in response to the contrasted decision problems. The data used by the *repeated measures* GLM analysis of variance procedure was the numerical data ranging from **1** to **5**, as described in the opening paragraph of this section. The procedure was useable on the ground that, while information pertaining to group membership and case ordering was coded as nominal data only, responses to the decision problems were viewable as data measured on an interval scale since the possible outcomes associated with consecutive options posed as alternatives within a decision problem changed in steps of \$100.

The *repeated measures* GLM analysis of variance procedure produced four standard sets of results — data on each of the dependent variables (including its mean), a *repeated measures* GLM MANOVA printout, a printout of a *repeated measures* GLM

between-subjects ANOVA, and a *repeated measures* GLM within-subjects ANOVA printout. As the within-subjects ANOVA tended to agree very closely with the MANOVA, only the ANOVA results are cited. Furthermore, since the research question relates to within-subject changes of risk propensity, the between-subjects ANOVA results are provided, but not commented upon unless they turned out to be of particular interest.

The *repeated measures* General Linear Model procedure for analysis of variance is similar to the procedure used by Dusenbury (1994). Dusenbury reported the *F*-statistics from *repeated measures* ANOVA to test for differences in the means of his responses. He justified this on the ground that the residuals obtained from the procedure, when tested for normality in terms of the Shapiro-Wilks'⁷ *W* statistic and the Hartley test for homogeneity of variance, were shown to be normally distributed and homoscedastic.⁸ In the current study, the residuals obtained from the *repeated measures* GLM analysis of variance procedure were tested, by means of SAS's UNIVARIATE procedure, for normality in terms of the Shapiro-Wilks' *W* statistic. The residuals were indeed normally distributed, and no noteworthy departures from homoscedasticity were found.

5.2 Validation Testing

The validation procedure was performed on the five decision-problem scenarios collectively, twice — once on the combined sample, and once on the 1997-1998 random sample. The significance level (the maximum probability of a Type 1 error allowable if the null form of a hypothesis is to be rejected⁹), which was used in the study, was the generally recognised five percent benchmark. This was also used by Dusenbury (1994). Nevertheless, results which could be considered weakly significant in that they do not exceed the ten percent benchmark probability of a Type 1 error, have been reported in the study's summary results. (There are no such results

⁷ Dusenbury (1994), op. cit. n. 4, p. 10, footnote 10. Dusenbury refers to the Shapiro-Wilkes *W* statistic. The SAS Procedures Guide for Personal Computers, on the other hand, refers to the Shapiro-Wilks' *W* statistic, which, although spelt differently, clearly fills the same function. Since the data examined in the current study was processed by means of SAS, the SAS nomenclature has been adopted.

⁸ Dusenbury (1994), p. 10, footnote 10.

⁹ A Type I error involves rejecting the null hypothesis when the null hypothesis is actually correct.

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of this nature in the validation tests.) The results of the two validation tests are reported in Appendix 3 Table 1 and Appendix 3 Table 2, and in Table 7 and Table 8 below in summary form:

Table 7: Validation Tests conducted in SAS's General Linear Model ANOVA Procedure¹

Source of Observations (Years)	Response Variables	Categorical Variables	Significant Between Subjects Effects	Significant Within Subjects Effects	F-Stat	Pr > F
1995 + 1997/8 1997/8	All five cases All five cases	Group|Float|Order Group|Order	Nil Nil	Case Case	13.44 12.03	0.0001 0.0001
¹ The terms and formats used in this table are explained in Table 8 which follows						

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Table 8: Summary of Terms used in the Tabling of Results.

1	Response Variable	There are five of these. They are the sets of datapoints recording how participants responded to the five decision problems laid out in the experiment. This was reduced from seven decision problems in the 1995 experiment.
2	Categorical Variable	In the General Linear Model ANOVA process, this type of variable is used in order to determine whether some exogenous (i.e. independent) influence may explain some of the variance within the response variable data sets. There are two types of categorical variable. The first type consists of data sets relating to the circumstances in which a participant underwent the experiment. "Group", "Order" and "Float" are examples of the first type. The second type consists of data sets generated from the participants responses to the end-of-experiment questionnaire. "Gender", "Age" and "Medins" are examples of this second type.
3	CASE	This variable is generated by the repeated measure General Linear Model ANOVA procedure. It is the measure of the difference between sets of observations associated with two or more different response variables
4	GROUP	This categorical variable is the set of datapoints defining which recruitment batch each of the participants belonged to. Four unrelated organisations furnished participants in the 1995 sample; and in 1997/8, participants were recruited from two random samples of 300 taxpayer names and addresses (including names of persons no longer known at the given address) in Christchurch, and from a third sample of the same size of Wellingtonian taxpayer names and addresses.
5	FLOAT	In the 1995 experiment, participants were given one of three different levels of cash float with which to meet their financial obligations within the experiment. These were a high-level float of \$4200, a high level float of \$3500. The low level float, \$2100 was given to half of the 1995 experiment participants and all of the 1997/8 experiment participants. The issue in 1995 was whether a discernible difference could be detected between the behaviours of participants with the different float levels. This was not built into the 1997/8 experiment; but differences in behaviour between the 1995 \$2100 float holders and the 1997/8 \$2100 were tested for.
6	ORDER	This categorical variable records the order in which a participant was given the five decision problems in the experiment. In the 1995 experiment here were 19 different orders, randomly determined; and in the 1997/8 experiment the number was restricted to 4 with the proviso that Tax Case X and the Health Insurance Case were to be kept apart by at least one intervening decision problem. The total number of case orders was 20.
7	MEDINS	This categorical variable was developed from responses to Question 4 in the end-of-experiment questionnaire. Question 4 had five levels of response. This was reduced to two in Medins: those strongly against, moderately against and neutral about private health insurance in the light of changes in New Zealand's Public Health System were deemed to be "against"; and those moderately in favour and strongly in favour were deemed to be in favour.
8	Group|Float|Order	The "|" symbol indicates that the General Linear Model ANOVA procedure computes the effects of the individual variables and also the interaction effects of every multiplicative combination of the named variables, Group, Float and Order.
9	Case*Order	The "*" symbol indicates that there is an interaction effect between the two variables, Case and Order. This is multiplicative, and can be read as Case times Order.

Table 8: Summary of Terms used in the Tabling of Results Continued.

10	Partitioning	For the purpose of isolating subsamples of participants sharing a common quality or attitude, the full sample is filtered so that all participants not sharing that common attribute are dropped. Table 12 furnishes results with respect to Hypothesis 2 for the subsample of participants from both 1995 and 1997/8 who are not in favour of (i.e., “against”) holding private health insurance. Table 13 furnishes results for the participants from both 1995 and 1997/8 who indicated they were in favour of holding private health insurance.
11	<i>F</i> -Statistic	A numerical measure of the existence of a main or interaction effect. The higher the value of <i>F</i> , the stronger the influence of the effect.
12	$Pr > F$	This figure indicates the level of likelihood of an error in which the null hypothesis will be rejected on the basis of the evidence computed from the sample, when in actual fact the null hypothesis is correct for the population in general. If $Pr > F$ is smaller than 0.001, there is a 1/10 of one percent chance of an erroneous rejection of the null hypothesis. Conventionally, any $Pr > F$ up to 0.05 (5 percent likelihood of error) allows for confident rejection of a null hypothesis. A $Pr > F$ between 0.05 and 0.10 may be cited as a weak validation for rejecting the null hypothesis.

The *repeated measures* GLM statistical output provides strong validation of the experimental conditions and sample selection arrangements. Panel A of Appendix 3 Table 1 contains the *F*-statistics for the between subject main effects brought about by the influence of group membership, the monetary float level or order of scenario presentation and their mutual interaction with respect to the full sample. The insignificance of the *F*-statistics in Table 2 of Appendix 3 indicates that no significant between-subjects main or interaction effects were found.

The within-subject main and interaction effects are reported in summary form in Table 7 above, and in greater detail in Panel B of Appendix 3 Table 1. In these tables, the *repeated measures* GLM procedure has created the variable, CASE. The *F*-statistic associated with CASE is a measure of difference between the mean of observations of the refund Tax Case Y variable and the means of observations for the other four replication scenarios. CASE, alone, is statistically significant ($F = 13.44$, $Pr > F = 0.0001$), indicating that the responses to the four scenarios were significantly different from the Tax Case Y responses. No within-subject interaction effects come close to being significant at the five percent benchmark. These findings are corroborated in terms of the Greenhouse-Geisser and Huynh-Feldt Epsilon statistics cited in Panel C of Appendix 3 Table 1.

The statistical output recorded in summary form in the second row of Table 7 and in depth in Appendix 3 Table 2 provides similar strong validation of the experimental

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conditions and sample selection arrangements with respect to the 1997 - 1998 random sample. In this instance, the categorical variable, FLOAT was dropped, as there was only one level of float given in the 1997 - 1998 experiment. Again, no significant between-subject main or interaction effects were found (Panel A of Appendix 3 Table 2); and only CASE was significant ($F = 12.03$, $Pr > F = 0.0001$) with respect to the within-subject effects (Appendix 3 Table 2, Panel B).

The impact of the variable FLOAT, mentioned in the section four of this report (Research Method), was tested for by subjecting the responses to the five decision problems made by all participants receiving a \$2100 float to a nonparametric testing procedure, the *NPAR1WAY* procedure provided by SAS. The procedure was used for performing the Brown-Mood *k*-sample median test and the Kruskal-Wallis test. In both instances, the null hypothesis tested was that participants in 1997 - 1998 did not make decision problem choices with risk levels different from those chosen by the 1995 participants (with respect to the same decision problems) who were given a \$2100 cash float. The results are summarised in Table 9 below¹⁰:

Table 9: Tests to determine whether the impact of the variable, FLOAT, was consistent between the samples generated in 1995 and 1997 - 1998.

Response Variable	Brown-Mood <i>k</i> -Sample Median Test			Kruskal-Wallis Test		
	CHISQ	DF	Pr > CHISQ	CHISQ	DF	Pr > CHISQ
Refund Tax Case Y	0.0628	1	0.8023	0.00167	1	0.9674
High Pay Tax Case X	0.01286	1	0.9097	0.01718	1	0.8957
Health Insurance Case	3.4989	1	0.0614	4.5662	1	0.0326
Low Pay Tax Case Z	0.79224	1	0.3734	1.6285	1	0.2019
Gamble Case	0.19832	1	0.6561	0.06322	1	0.8015

The results in Table 9 indicate that the 1997 - 1998 random sample participants made choices insignificantly different from those of the 1995, \$2100 float participants in four out of the five cases. On this basis, the null hypothesis for the Health Insurance case could not be rejected with respect to any of the tax cases and with respect to the gamble case.

However, in terms of the Kruskal-Wallis test, the null hypothesis was rejected at the five percent level of error; and in terms of the Brown-Mood *k*-sample test, more

weakly rejected within the ten percent level of error. This indicates that the 1997 - 1998 participants did react in a different manner to the health insurance scenario. The mean in the 1997 -1998 experiment for this decision problem was 23 percent with a standard deviation of 12 percent (see Table 6 above).

In the 1995 experiment, the mean was 17 percent and the standard deviation, 14 percent. However, this treatment differential with respect to the health insurance decision problem should not invalidate consideration of the combined sample with respect to the three hypotheses investigated in this report. This issue will be commented upon further in the subsection below dealing with results pertaining to H_{2A} .

5.3 Hypothesis H_{1A}

This hypothesis, stated in its alternative form as it was by Dusenbury (1994, p. 6), is repeated here for convenience:

H_{1A} : Participants will choose riskier options in the *high pay* case than in the *refund* case.

The null form — that participants will choose either less risky options or that there will be no difference in chosen option risk levels — is rejected in terms of both the combined sample and the 1997 - 1998 random sample. The results are summarised in Table 10 and in Appendix 3 Table 2 and Appendix 3 Table 3. The combined sample, which contained three levels of cash float furnished two significant effects. The difference between responses to the Refund Tax Case Y and High Pay Tax Case X , captured in the variable CASE, was significant at the one percent likelihood of a Type 1 error ($F = 7.71$, $Pr > F = 0.0065$). The Case*Float interaction effect was shown to be significant within the five percent benchmark level of error ($F = 3.26$, $Pr > F = 0.0427$). This indicates that participants were influenced by the level of cash they had on hand to meet their experimental obligations.

The means for each float-related category of participant are set out in Table 10. It is clear, from Table 10, that the participants who were given a lower level of float were

¹⁰ The full test results are provided in Part B of Appendix 3.

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consistently more risk averse with respect to the Refund Tax Case **Y**. It is also clear that participants working with a higher-level float tended to choose a lower level of risk with respect to High Pay Tax Case **X** than did the \$2100 float participants.

Table 9: Means of Response Variables broken down by Float.

		Means stated as Percentage		Standard Deviation	
PANEL A: Combined Sample					
FLOAT	N	CASEY	CASEX	CASEY	CASEX
\$4200 (offered in 1995)	30	18%	21%	12%	13%
\$3500 (offered in 1995)	36	17%	17%	12%	12%
\$2100 (both experiments)	126	15%	23%	12%	12%
PANEL B: Breakdown of \$2100 Float					
FLOAT	N	CASEY	CASEX	CASEY	CASEX
\$2100 (1995)	66	15%	23%	11%	11%
\$2100 (1997 - 1998)	60	15%	23%	12%	12%

However, the \$4200 float participants exhibited a higher mean risk level (21 percent) than did the \$3500 float participants (17 percent).¹¹ Nevertheless, the pattern apparent in the mean data underlying the CASE*FLOAT interaction effect may be interpreted as showing that the size of cash float produces a discernible decision frame effect in its own right.

With respect to the 1997 - 1998 random sample considered in isolation, there is no identifiable cash-float effect because only one level of cash float was used. The null form of H_{1A} is, however, rejected more emphatically at the one percent level of a Type 1 error ($F = 11.14$, $Pr > F = 0.0016$).

¹¹ However, it is to be noted that the size of these subsamples at $N = 30$ and 36 is considerably smaller than the size of the subsamples available for considering the behaviour of the \$2100 cash float participants.

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Table 10: General Linear Model ANOVA Tests conducted in SAS¹.

Hypothesis (and Table in Appendix 3)	Partitioning of Sample by Variable from Questionnaire	Source of Observations (Years)	Response Variables	Categorical Variables	Significant Between Subjects Effects	Significant Within Subjects Effects	F-Stat	Pr > F
T3 Hypothesis 1	Nil	1995 + 1997/8	Tax Case Y, Tax Case X	Group|Float|Order	Nil	1. Case	7.71	0.0065
T4 Hypothesis 1	Nil	1997/8	Tax Case Y, Tax Case X	Group|Order	Nil	2. Case*Float Case	3.26 11.14	0.0427 0.0016
T5 Hypothesis 2	Nil	1995 + 1997/8	Tax Case X, Health Case	Group|Float|Order	Nil	Nil		
T6 Hypothesis 2	Nil	1997/8	Tax Case X, Health Case	Group|Order	Nil	Nil		
T7 Hypothesis 2	Nil	1995 + 1997/8	Tax Case X, Health Case	Group|Float|Order|Medins	Float*Medins	Case*Medins (weak)	3.44	0.0672
T8 Hypothesis 2	Nil	1995 + 1997/8	Tax Case X, Health Case	Group|Float|Medins	Group*Float*Medins	Case*Medins	3.89 8.63	0.0517 0.0038
T9 Hypothesis 2	Nil	1997/8	Tax Case X, Health Case	Group|Medins	Nil	Case*Medins	2.36	0.0972
T10 Hypothesis 2	Nil	1995 + 1997/8	Tax Case X, Health Case	Group|Order|Medins	Order*Medins	Nil	4.59	0.0366
T11 Hypothesis 2	Nil	1997/8	Tax Case X, Health Case	Group|Order|Medins	Nil	Nil	1.77	0.0906
T12 Hypothesis 2	Medins(Against)	1995 + 1997/8	Tax Case X, Health Case	Group|Float|Order	Nil	1. Case 2. Case*Group*Order 3. Case*Float (weak) 4. Case*Order	16.56 8.23 5.36 7.10	0.0066 0.0130 0.0599 0.0121
T13 Hypothesis 2	Medins (In Favour)	1995 +1997/8	Tax Case X, Health Case	Group|Float|Order	Nil	Case	5.68	0.0196
T14 Hypothesis 2	Medins (Against)	1997/8	Tax Case X, Health Case	Group|Order	Nil	1. Case 2. Case*Group*Order	21.36 6.91	0.0057 0.0364
T15 Hypothesis 2	Medins (In favour)	1997/8	Tax Case X, Health Case	Group|Order	Nil	Nil		
T16 Hypothesis 3	Nil	1995 + 1997/8	Tax Case Z, Gamble Case	Group|Order|Float	Nil	Case	38.34	0.0001
T17 Hypothesis 3	Nil	1997/8	Tax Case Z, Gamble Case	Group|Order	Nil	Case	31.16	0.0001

¹ The terms and formatting used in this table is explained in Table 8.

5.4 Hypothesis H_{2A}

The second replication hypothesis, as formulated in its alternative form by Dusenbury (1994, p.7):

H_{2A}: *Participants will choose less risky options in the health insurance case than in the high pay tax case.*

The test results are again summarised in Table 10 above and printed in full in Appendix 3 of this report. The null form of the hypothesis could be rejected neither in terms of the combined sample nor the 1997 - 1998 random sample. This result was a departure from Dusenbury's (1994) North American finding that participants were significantly more risk averse with respect to health insurance than they were to a tax issue in which the monetary risks and returns were identical.

Given that the variable associated with the health insurance case, CASEM, was the only response variable treated in a measurably different fashion by \$2100 float participants with respect to their year of participation, testing of H_{2A} on the combined sample was performed in two ways with respect to the inclusion of FLOAT as a categorical variable. First FLOAT was coded to report three observation values (one for each float level); and second, it was coded to show four levels of value, the fourth level being a discreet value to separate the 1997 -1998 participants (who all received \$2100) from the 1995 \$2100 float participants. In both instances no main or interaction effects of any notable level of statistical significance were found, and the null form of H_{2A} remained unrejectable.¹²

However, a valuable insight into this difference of outcome in the New Zealand experiment was obtained a further categorical variable was employed in the analysis. This variable coded participants' attitude to private health insurance with respect to their perception of the public health system. The variable, MEDINS, was derived from responses to an item in the end-of-experiment questionnaire:

¹² Nevertheless the following statistical analyses of the combined sample (with respect to H_{2A}) employ four, not three levels of the categorical variable FLOAT.

4. Attitude to Health Insurance

Given the current state of the public health system in New Zealand, how worthwhile do you consider a personal health insurance scheme to be for you or other members of your family?

Please tick the box which most closely approximates your judgment of it:

- It is ridiculous
- It is not very necessary
- I am neither for nor against
- I think it is a reasonable thing to have
- I would not be without it

Responses to this item were coded 1 for the first three boxes, and 2 for the final two boxes. Code 1 participants were either not in favour of having private health insurance or were neutral about it in the light of their opinion of the public health system. Code 2 participants, on the other hand, were those who had declared themselves either mildly or strongly in favour of being privately insured.

When MEDINS was employed as an extra categorical variable in *repeated measures* GLM analysis of variance procedures on the data, a CASE*MEDINS interaction effect was detected. When MEDINS was applied to the combined sample, the CASE*MEDINS effect was weakly significant ($F = 3.44$, $\text{Pr} > F = 0.0672$, Appendix 3 Table 7). However, when the categorical variable, ORDER, was removed from the procedure, CASE*MEDINS became more strongly significant ($F = 8.63$, $\text{Pr} > F = 0.0038$, Appendix 3 Table 8).

In terms of the 1997 - 1998 random sample in isolation, there was no significant interaction effect when GROUP, ORDER and MEDINS were employed jointly as categorical variables; but when ORDER was dropped, CASE*MEDINS achieved significance within the five percent level of error ($F = 4.59$, $\text{Pr} > F = 0.0366$, Appendix 3 Table 9). In terms of the statistical analysis it would seem that the impact of MEDINS was sensitive to the impact of ORDER. This is borne out by the appearance of a solitary weak ORDER*MEDINS between-subjects effect ($F = 1.77$, $\text{Pr} > F = 0.0906$, Appendix 3 Table 10) when GROUP, ORDER and MEDINS were employed as categorical variables.¹³

¹³ The impact of ORDER may be accounted for as follows. Financial decision makers will always prioritise their expenditures, and will do so more stringently when money in their budgets is running short. Consequently participants in the experiment

Nevertheless, the above evidence provided sufficient incentive to explore what would happen if the combined and 1997 - 1998 random samples were partitioned in terms of participants' MEDINS coding status. This gave rise to two sets of results per sample — a pro-private insurance subsample and an anti-private insurance subsample for each. It was posited that a subsample of participants who had declared themselves not in favour of having private health insurance would tend to be more risk averse with respect to tax than when buying health insurance. A significant CASE variable in this instance, although not effecting a rejection of H_{2A} , would nevertheless indicate the presence of a separate context-related decision frame associated with each decision problem. The results for these are summarised in Table 8 and Table 9, and printed in full in Appendix 3, Tables 12 to 15 at the end of this report.

With respect to the combined sample, participants who favoured private health insurance exhibited a shift in risk preferences significant at less than the two percent level of error. This was captured by the variable CASE ($F = 5.68$, $Pr > F = 0.0196$, Appendix 3 Table 13). Participants who were against holding private health insurance exhibited a strong CASE effect ($F = 16.56$, $Pr > F = 0.0066$). However, this is mitigated by a significant CASE*GROUP*ORDER interaction effect ($F = 8.23$, $Pr > F = 0.0130$); a weak CASE*FLOAT interaction ($F = 5.36$, $Pr > F = 0.0599$); and a strongly significant CASE*ORDER interaction effect ($F = 7.10$, $Pr > F = 0.0121$). (All of these effects are detailed in Appendix 3 Table 12.)

With respect to the 1997 -1998 random sample, the subsample of participants in favour of holding private health insurance produced no main or interaction effects of any significance; but the small subsample of those against private insurance produced a strong CASE effect ($F = 21.36$, $Pr > F = 0.0057$) mitigated by a strong CASE*GROUP*ORDER interaction ($F = 6.91$, $Pr > F = 0.0364$). (These effects are detailed in Appendix 3 Table 14.) The means of these partitioned samples are contained in Table 12:

Table 11: Means of Response Variables partitioned by MEDINS.

<p>may be expected to place less value on paying for a good health insurance policy, the later in the problem schedule the health insurance decision problem is placed. Participants who do not value the holding of private health insurance (coded MEDINS = 1) will be particularly susceptible to this ordering effect.</p>
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		Means stated as Percentage		Standard Deviation	
PANEL A: Combined Sample					
Partition with respect to Private Insurance	N	CASEX	CASEM	CASEX	CASEM
Favoured Private Insurance	152	22%	17%	12%	13%
Did not favour	40	15%	20%	13%	12%
PANEL B: 1997 -1998 Random Sample					
Partition with respect to Private Insurance	N	CASEX	CASEM	CASEX	CASEM
Favoured Private Insurance	48	23%	22%	12%	12%
Did not favour	12	20%	28%	11%	9%
PANEL C: 1995 Sample					
Partition with respect to Private Insurance	N	CASEX	CASEM	CASEX	CASEM
Favoured Private Insurance	104	21%	15%	12%	13%
Did not favour	28	21%	24%	12%	13%

This more complex picture of participants' risk preferences with respect to H_{2A} is summarised in Table 13. It is to be noted a rejection of the null form of H_{2A} requires that there be a statistically significant shift in risk preference (captured by the CASE variable) from the health insurance position to a higher risk preference with respect to High Pay Tax Case X. Nevertheless, a context-related decision frame effect is also shown to exist when the risk shift is in the opposite direction and is validated by a significant CASE effect.

Table 12: Summary of Risk Shifts with Respect to High Pay Tax Case X and the Health Insurance Case.

Sample	Partition with Respect to Private Health Insurance	Percentage Shift	Riskier Preference	Significant CASE Effect?
1995 + 1997 - 1998	Nil	3%	High Pay Tax Case X	NO
1995 + 1997 - 1998	In Favour	5%	High Pay Tax Case X	YES
1995 + 1997 - 1998	Not in Favour	5%	Health Insurance Case	YES
1997 - 1998	Nil	1%	Health Insurance Case	NO
1997 - 1998	In Favour	1%	High Pay Tax Case X	NO
1997 - 1998	Not in Favour	3%	Health Insurance Case	YES
1995	Nil	4%	High Pay Tax Case X	NO
1995	In Favour	6%	High Pay Tax Case X	YES
1995	Not in Favour	3%	Health Insurance Case	NO

The final column of Table 13 indicates that the null form of H_{2A} was not rejected on any of the unpartitioned samples. However, when the three samples were partitioned into two subsamples apiece, a significant CASE statistic was recorded in four out of six instances, while the six underlying risk shifts were all in the predicted direction. These four significant CASE statistics provide evidence of the presence in the participants' thought processes of context-related decision framing. Given that the two significant CASE statistics associated with 'in favour' subsamples confirm that participants who supported the concept of having private health insurance were shown to be more risk willing with respect to tax, this evidence allows for a qualified rejection of H_{2A} 's null form.

5.5 Hypothesis H_{3A}

The third hypothesis was (Dusenbury 1994, p. 7):

H_{3A} : Participants will select riskier options in the gamble case than in the *low pay* tax case.

The null form of this hypothesis was rejected in terms of both the combined sample and the 1997 - 1998 random sample. With respect to the combined sample, the rejection, as shown by the level of the variable, CASE, is very strong indeed ($F = 38.34$, $Pr > F = 0.0001$, Appendix 3 Table 16). In terms of the 1997 - 1998 sample the rejection is slightly lower, but value of the F -statistic associated with CASE is still very high ($F = 31.16$, $Pr > F = 0.0001$, Appendix 3 Table 17). Neither

test produced any other significant within-subjects interaction effects; and there were no significant between-subjects main or interaction effects. The results for both samples are summarised in Table 10, which appeared earlier in this report.

6. Conclusions, Policy Issues and Limitations

6.1 Conclusions and Policy Issues

To the extent that this study replicates Dusenbury (1994), strong evidence was produced showing that the New Zealand-participants behaved in a similar manner to their North American counterparts in Dusenbury's study. This similarity of outcome tends to suggest, more generally, that tax compliance research conducted in the United States may well be relevant to the New Zealand tax compliance context, if and when, stated opinions and cultural patterns of taxpayers are shown to be similar or identical.

The major strength of Dusenbury (1994), which carried over into the current study, was the use of within-subject contrasts. This focused attention on the risk preference shifts made by each participant without reference to a benchmark provided by any other participant.

With respect to Dusenbury's first hypothesis, which was also H_{1A} in this study, the 60 New Zealand participants, who constituted a random sample generated in 1997 - 1998, chose risk levels which were relatively more risk averse when a tax refund was in the offing, and risk levels which were relatively more risk seeking when a tax payment was required. This finding was repeated in terms of the combined sample in which the 1997 - 1998 random sample was coalesced with the Anderson (1996) sample of 132 participants. The evidence allowed rejection of the null form of Hypothesis H_{1A} . Since H_{1A} codified the central research question in both Dusenbury (1994) and the current project, this finding indicates that the two studies are essentially congruent.

Investigation of the ensuing hypotheses (H_{2A} and H_{3A}) took the form of providing corroboration for, and greater understanding of, the answer obtained to this central research question.

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The study's 192 participants, when permutations of the samples were partitioned in terms of attitude towards the holding of private medical insurance, provided evidence allowing a qualified rejection of the null form of H_{2A} — that participants will be relatively more risk averse when choosing among health insurance options than when choosing among financially identical terminal tax payment options.

The reason for the qualification was an underlying cultural difference detected as a result of the subjects in the New Zealand study being asked to disclose their attitude towards health insurance. New Zealand, in the past, has maintained a public health system, which was believed, by the bulk of its population, to meet the medical needs of all New Zealanders. By contrast, the United States of America has never provided its citizens with universal access to high quality federal- or state-funded medical care. Consequently North Americans may be expected to take out medical insurance as a matter of course, whereas this has not been generally true of New Zealanders.

However, in the last ten years there has been a change. Today there is a general perception in New Zealand that the public health system is no longer capable of fulfilling its traditional role. This perception extends to an expectation that citizens who can afford to do so, should plan ahead to cover the cost of their own health crises. However, the New Zealand psyche, is at present in a state of transition, with part of the population adopting a North American way of thinking, and with the rest still maintaining faith in the existing public health system's ability to cater for them if the need arises.¹⁴

The study found that participants who value private medical insurance behaved similarly to their North American counterparts in adopting a relatively greater level of risk aversion in their response to the Medical Insurance Case than in their response to High Pay Tax Case X. However, those who rejected the need for private health insurance responded to the Medical Insurance Case by taking on a greater level of risk in this area. With this cultural difference taken into account, the current study concurs with the finding on H_{2A} of Dusenbury (1994).

¹⁴ Further discussion of this complex issue, with its many economic and political ramifications, is beyond the scope of this study, as is any proper analysis of changes in the New Zealand public health system. The only aspect relevant to this study is the public perception mentioned in the text, and solicited in Questions 4 and 5 of the questionnaire for the purpose of evaluating H_{2A} .

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In terms of the both the 1997 - 1998 random sample and the combined sample of 192 subjects, the New Zealand study also concurred with Dusenbury (1994) in finding that the taxpayer-participants were significantly more risk willing in their responses to the Gamble Case than they were when responding to a tax case in which the risks and returns were identical, option for option. In both studies, the null form of H_{3A} , could therefore be rejected. This also provides further endorsement of Baldry (1986), who detected this systematic difference when comparing tax evasion and gambling in the Expected Utility Theory paradigm.

These findings underline the importance of two phenomena with policy implications. The first is the importance context-related decision frames. Taxpayers, quite aside from whether they make accurate disclosures or not, take the issue of declaring their tax positions seriously. The results show that reporting one's tax position is a more serious issue than gambling in the minds of the participants, who were overwhelmingly more risk averse with respect to Low Pay Tax Case **Z** than to the Gamble Case in which the risks and returns were the same.

In the second instance, tax withholdings do influence taxpayers' compliance behaviour. All that is required in order to bring about a reduction in taxpayers' preferred levels of risk is for a gain frame to be made apparent when they prepare their tax returns for filing. This, in turn may be assured by the tax authority's collections of PAYE and provisional tax at a pay-period rate which is, at the minimum, in line with the rate levied on a taxpayer's income in its annualised form. However, it is acknowledged this is easier to achieve in terms of PAYE than provisional tax.

One area of interest in the Anderson (1996) New Zealand replication and extension of Dusenbury (1994) was the incorporation of a cash flow dimension, which enters the current study via the study's use of the combined sample. It was found that the level of float impacts on participants' choices of risk level. When required to choose among gains, participants with lower floats were more risk averse and were correspondingly more risk willing when required to choose among pay-outs. This finding does not negate what has already been established in terms of the New Zealand-North American cross-cultural comparison.

Several further comments are pertinent to the risk preference patterns displayed by the New Zealand taxpayer-participants in this study. Like Dusenbury's (1994) subjects, the New Zealand participants were risk averse in absolute terms. Dusenbury (1994, p. 13) noted that the mean risk level, in his study, for all three sets of tax case responses combined was only 17 percent.¹⁵ When rounded to the nearest integer, the mean response over the New Zealand study's three tax cases was 18 percent for both the combined sample and the 1997 - 1998 random sample.

Furthermore, the relative shifts in risk preference were also small. The largest mean risk level adopted was only eight percentage points greater than this mean tax level, at 26 percent in the Gamble Case (recorded on the combined sample), and which rose a further one point to 27 percent with respect to the random sample. These results belong very strongly in the same ball park as those recorded by Dusenbury, as his equivalent was 27 percent, again recorded in the Gamble Case. Dusenbury (1994, p. 13) noted that findings of this order were indeed risk averse, since many tax professionals would consider reasonable even the 40 percent risk associated with both studies' riskiest options.

The results of the current study also concur in this respect with the findings of Chang, Nichols and Schulz (1987), who tested their laboratory subjects for risk willingness and risk aversion in terms of the subjects' choices between agreeing to play lotteries and accepting, instead, their certainty alternatives. Chang et al's subjects were found to be risk averse in all instances apart from when tax payments were viewed as a pure loss. The current project's result, in this respect, also concurs with Schepanski and Kelsey's (1990) finding of mildly risk averse behaviour when subjects, given a decision problem with loss frame characteristics, faced probabilities of detection greater than 20 percent.

A further valid point was made by Dusenbury (1994, p. 13) regarding the recording of significantly different risk levels for paired scenarios containing identical sets of monetary risks and returns, but dissimilar in financial context. He noted that this implied that a single preference ordering (value function) would have to have two

¹⁵ The mean of 15% (*refund* case), 20% (*high pay* case) and 15% (*low pay* case) is 16.67 in Dusenbury's study. The 1995 New Zealand study's equivalent was 17.33%, which is the mean of 16% (*refund* case), 21% (*high pay* case) and 15% (*low*

slopes at the same point. The absurdity of this statement implied that, instead, two separate value functions must exist, and that they were induced by the context-sensitivity of the participants.

Responses to the nineteen question end-of-session questionnaire made possible the investigation of a number of further factors potentially impinging on the risk levels participants chose in the project. One of these factors was found to be influential in determining participants' risk choices in the Medical Insurance Case. This was the participants' attitudes to the holding of a private health insurance policy, solicited in Question 4 and mentioned earlier in this section of this report.

6.2 Limitations

The limitations recognised by Dusenbury (1994) with respect to the North American study apply in the main in this New Zealand conceptual replication. In the first instance, while the participants of the 1997 - 1998 sample were randomly selected, the participation rate was low. Therefore, in Dusenbury's (1994, p. 14) words, "...the representativeness of the subject pool is unknown." Nevertheless, the close correlation of the results produced from this sample and from the 132 participants furnished by four fund-raising organisations in 1995 suggests one of two things: either both samples reflect the risk-related behaviour of the taxpaying population at large; or, alternatively, both the random and non-random groupings were skewed in the same manner.

The factor most likely to have caused skewing is that of the participants' altruism. All of the volunteers in the 1995 experiment participated on the basis that their efforts would raise money for the organisation which had recruited them. Most of the random sample participants chose to donate their experimental earnings to a charity. Even those who did not could have been seen motivated by a sense of community feeling in choosing to become involved in a university-based laboratory experiment in which the advertised range of returns would cover petrol costs but not much more. Altruism may well be possibly unrepresentative of the nature of New Zealand taxpayers in general, but the validity of this conjecture is not easily ascertainable. The questionnaire item concerning how participants wanted to dispose of their

pay case).

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earnings was entered as a categorical variable in tests of all five response variables in the experiment. This altruism proxy variable was found not to be a significant indicator of risk preferences.

A further limitation is inherent in the selection of the levels of risk and return employed in the five options of each decision problem in the study. In all five of the scenarios which have been used and discussed, the parameters of uncertainty, risk levels, costs and benefits were copied from Dusenbury (1994, p. 14). Dusenbury himself noted that these settings might well be an inaccurate representation of all tax return-filings.

An attempt was made, however, to provide a context recognisable to New Zealand taxpayers in each of the scenarios. The New Zealand tax rates of 24 cents in the dollar for income under \$NZ30,875 and 33 cents for every dollar of income earned in excess of that benchmark, were employed with respect to the 1995 experiment; and the new rate of 21.5 cents in the dollar (up to \$NZ34,200) was employed in the 1997 - 1998 experiment. Furthermore, the story-lines were adapted to show the impact of prior withholdings on the riskless filing option.

What cannot be known is the actual level of risk taxpayers expose themselves to when they record unjustifiable net taxable income figures in their actual tax returns. The Inland Revenue Department does not divulge information of this nature. In this project it was noted that the participants believed that the Inland Revenue Department's audit rate was 24 percent.¹⁶ The percentage of respondents to a mail survey conducted in the same New Zealand city in 1992, who said they had been subjected to a tax audit, was also 24 percent (Hasseldine and Kaplan, 1992, p. 51). However, the belief (whichever way it is measured) that the audit rate is set at this level does not make it so in actuality. The policy implication of this finding is that a perception of a higher-than-actual tax return audit level is likely to induce a higher level of voluntary compliance than would otherwise be the case.

A related limitation of the current study was the jettisoning of Dusenbury's uniformity of income figures given in the tax decision problems. This potentially

¹⁶ Question 10, *Perception of likelihood of an audit by the tax authorities.*

transformed the story-line income figure into a confounding variable. There was an increase in income between Refund Tax Case **Y** and High Pay Tax Case **X**. If this income information induced a decision frame in participants' minds, then the framing effect was one of a perceived gain. According to Prospect Theory, gain frames produce risk averse decision making. However, the observed shift in risk preference was towards greater risk willingness. This would suggest that the perceptions of loss associated with choices amongst terminal tax payments induced a more robust framing effect.

The inability of the study to make definitive claims with respect to the absolute magnitudes of shifts in risk preferences constitutes a further limitation, which was also recognised by Dusenbury (1994, p. 14). Nevertheless, the five-option scale used by Dusenbury and in the current study has allowed for a more sophisticated mapping of these shifts than was possible in prior Prospect Theory-related tax compliance studies. The range of risks was kept relatively limited and low; but this possibly added to the realism, since the New Zealand participants believed the mean tax audit rate to be only 24 percent.¹⁷

¹⁷ See Schadewald, M. S., (1989), "Reference Point Effects in Taxpayer Decision Making", discussed in section two of this project. Schadewald's use of a 70% detection rate was subjected to critical analysis by Schepanski and Kelsey (1990). Schepanski and Kelsey found that as the detection rate rose to 45%, a framing effect, visible when the detection rate was 20%, disappeared. It is probable that taxpayers will be influenced by gain/loss framing effects within the range of detection probabilities they assume they encounter in reality; but where the stated audit rate is higher than experimental subjects' personal expectations of it, it may be expected to exert an undue dampening effect on their experimental responses.

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Appendix 1: Documents used during the Laboratory Sessions

This appendix contains the documentation required for running the 1997- 1998 experiment. It is to be noted that the 1995 training document (not reprinted here) was identical with the exceptions that it contained references to two extension cases which were dropped from the 1997 - 1998 study, and also references to the fact that there were several levels of cash float. The 1997 - 1998 questionnaire has one extra question (Q20). The tax decision problems in the 1997 - 1998 experimental instrument contained different income figures from those used in the 1995 instrument. Hence the three 1995 tax scenarios are reprinted in this appendix.

The documents are presented in the following order:

Appendix 1 Part A: Preliminary Document

Appendix 1 Part B: Training Document

Appendix 1 Part C: The 1997 Experimental Instrument

Appendix 1 Part D: The 1997 Questionnaire

Appendix 1 Part E: The Cash Position Record

Appendix 1 Part F: The Debriefing Document

Appendix 1 Part G: The 1995 Tax Decision Problems

Appendix 1 Part A: PURPOSE AND NATURE OF THE STUDY

The purpose of the project is to study personal judgments, so there are no right or wrong answers. In particular the study is concerned about how people handle tax and medical decisions in situations where the law is not easily definable. Therefore in each situation, choose the option you feel most comfortable with.

The session will last about 60 minutes or up to 90 minutes at the very most. All your answers will be anonymous.

There is a questionnaire to fill out at the end of the session which will be used in the statistical analysis of the experimental results. Neither your personal results nor what you disclose in your answers to the questionnaire will become available to anybody other than the researchers (who only know you as a number). A summary of results will be available at the end of the project (November / June) for anyone who wishes to obtain one; but no individual will be identifiable in the end product.

This work is a collaboration between a university academic and a postgraduate bent on extending his thesis. The project is about decision making under uncertainty. While much of the experiment relates to tax payments, there is no traceable connection between the researchers and the IRD other than that they are ordinary taxpayers with accounting skills. The IRD has no access to information from this experiment that could identify any individual in any way.

Real cash awards will be paid direct to you. The amount depends on your choices and on chance outcomes which will be resolved through the use of a shaken-up bag containing a hundred numbered plastic chips. You may receive \$5 or more from your personal efforts, or you may receive nothing.

You are under no obligation to participate in this study. You may withdraw if you wish.

**Adrian Sawyer
Warwick Anderson**

**C/- the Department of Accountancy, Finance and Information Systems
University of Canterbury
Private Bag 4800
Christchurch.**

Ph (03) 364-2617.

Appendix 1 Part B: TRAINING SCRIPT:

Consent

You are invited to participate in the research project with the working title, 'Personal Financial Judgements' by completing the following experiment and questionnaire. The aim of the project is to determine how people handle tax and medical decisions in situations where the law is not easily definable. Both parts of this undertaking are anonymous, and you will not be identified as an informant without your consent. You may at any time withdraw your participation, including withdrawal of any information you have provided. By completing the experiment and questionnaire, however, it will be understood that you have consented to participate in the project, and that you consent to publication of the results of the project with the understanding that anonymity will be preserved.

Introduction

There are a number of different tasks in this experiment:

- Pay taxes,
- Pay medical insurance,
- Select a gamble.

All of these involve making decisions in the dark; and it is up to you how much risk you are prepared to take.

We would like you to imagine you are the person facing the situations in real life and act as you would act normally.

We would also like you to indicate what your second, third, fourth and fifth choices would have been (in order).

To make the payments you decide upon, you have a fund of play money amounting to \$2100. You can think of this as cash in your cheque account.

At the end of the session, the play money you still have is translated into real NZ money at NZ 30 cents per \$100 play money, and you will be paid up. If you have decided to donate your experiment earnings to one of the designated charities, we will give you a chit and pay the cash over in a lump sum with that of other donors to that particular charity.

- You may end up with a positive amount of play money or a negative amount (in debt play money-wise).
- If you end up with a negative amount, the NZ 30 cents per \$100 play money you owe is written off as uncollectible. You do not have to pay the deficit; but you also do not get any NZ dollar payout.

We have included the financial incentive in order to make the decisions as real as possible.

After the fifth situation we'd like you to answer a couple of general questions about what you have done so far; and then the session end with a questionnaire.

THE TASKS

TAX. In most of the situations we would like you to imagine that you are a tax-payer who has a certain income and who has had a certain amount of tax collected already by the tax authorities.

By the way, there is no connection between this experiment and any New Zealand tax body. The only connection between ourselves and the IRD is that we are taxpayers. Also the tax regulations in the situations we'd like you to look at are not necessarily real NZ tax regulations; but the tax rate was computed at the rate of 21½ cents in the dollar over the income ranges we give you.

Anyway, you have had some tax collected already by the tax authorities:

- This tax may have been the PAYE removed from your pay packet each pay day;
- Or this tax may be provisional tax you have had to hand over earlier in the tax year.

Now it is time to file your annual tax return, and your task is to make any payment due, or to claim a refund. The correct amount of tax is uncertain at the time you file your return.

- For example, your right to claim a rebate for a child may be uncertain because of the facts of the case.
- Or an activity which you consider a business may later be deemed to be a hobby, and hobby-related losses are not deductible.

Please picture the uncertain item to be something for which the correct amount cannot be determined exactly at the time you file your return.

If the amount you choose to report turns out to under-report your tax:

- You must pay the taxes owed plus \$300.
- The \$300 is to cover all monetary and nonmonetary costs such as lost work time, professional service fees, anxiety over the deficiency, etc.

As that tax-payer, choose how much (all, most, half, some, or none) of the uncertain item to report. **None of these choices would be illegal choices.**

Medical Insurance. Here your task is to make a choice of medical insurance policies. The five policies offer different levels of coverage.

- A family member may require services not covered by the policy you choose.
- In that case you will have additional costs for the uncovered medical services needed by a member of your family.

Gamble. In the gamble situation, you select one gamble from among five available choices. You may either win additional money, or you may have to make a payment from your fund.

DETERMINING FUTURE OUTCOMES

In reality, the consequences of choices like these would only be known in the future.

Here a bag containing 100 plastic chips will be used to determine the unknown outcomes. It exactly reflects the chances stated in the options:

- **Option B** has a 15% risk of an unfavourable outcome.
- **Option C** has an unfavourable outcome only if a chip with a number 25 or lower comes out of the bag of 100 chips.
- **Option D** has a 33% risk.
- **Option E** always has a 40% risk.

THE PROCEDURES

1. You receive a pack of play money and a large handout containing five cases and the questionnaire.

2. **After reading a case**, circle the option you prefer.

- (a) If that option requires a payment, put this payment into your PAYMENT ENVELOPE
- (b) If you file for a refund, the supervisor will give it to you.
Then you go on to the next case.

3. **After you have made your choices** in all the cases:

A chip is drawn from the bag containing all 100 chips for each case in which you chose an uncertain outcome:

- (a) If the chip has a number that is favourable, you make no further payment.
A favourable chip has a number higher than the level of risk.
- (b) If the chip is unfavourable, you hand over the required payment.
An unfavourable chip has a lower or equal value to the level of risk.

4. **After determining all the outcomes by selecting chips:**

- Any of your fund remaining will be recorded as a real cash contribution to be handed over to you (or to the charity of your choice) at the rate of 30 cents for each \$100 of play money.
- Or, if your fund ends up negative, neither you nor your chosen charity receive any remuneration.

Framing Effects and Taxpayer Risks when Filing Tax Returns

SAMPLE CASE: DAY CARE INCOME

You are married filing jointly with **taxable income of \$20,833** — which includes every last cent of what you have earned from a second income source, which was providing day care in your home for several neighbourhood pre-schoolers.

But this of course does not take account of the expenses you incurred earning this day care income.

But the amount of this day care income you should include in your tax return is uncertain.

This is because you have lost track of your receipts and other records detailing your costs for lunches, yard fencing, snacks, toys, use of your home, etc.

You are now preparing your tax return.

You have already made provisional tax payments totalling \$5,600, which is an **overpayment by \$600** on the \$20,833 income figure if the day care income is not reduced by some figure to account for the costs.

Consider both the risk of under-reporting and the dollar outcomes in **choosing the amount of this day care income** to report.

Option A: you include the total day care earnings. There is no risk of under-reporting your tax (though you may be overpaying).

In **Options B, C, D, and E**, you include less and less of the day care earnings in your reported total income, and both your refund and also your chance of under-reporting increases.

The risk of under-reporting your tax is:

- 15% in Option **B**,
- 25% in Option **C**,
- 33% in Option **D**,
- 40% in Option **E**.

TAX FILING OPTIONS -- Circle One

AMOUNT INCLUDED	(A) ALL	(B) MOST	(C) HALF	(D) SOME	(E) NONE
REFUND CLAIMED	REFUND \$600	REFUND \$700	REFUND \$800	REFUND \$900	REFUND \$1,000
RISK & COST OF UNDERPAYMENT RISK You pay out	0% \$0	15% \$200	25% \$300	33% \$400	40% \$500

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To include all of the Day Care Earnings, circle **Option A**, and raise your hand in order to be paid the \$600 refund.

- There is no risk of under-reporting in this Option, and you would not need to select a chip

To include most of the Day Care Earnings, circle **Option B** and raise your hand to be paid the \$700 refund.

- After making your choices in **all the cases**, you would then select chips from the bag.
- If the chip has a number lower than or equal to 15 (the percentage level of **B**), you will be considered to have under-reported your true tax.
- You would have to pay \$200 out of your fund.
- If the chip has a higher number than 15 you would be considered to be not under-reported.

And so on for **Options C, D and E**.

When you have made your choice, then write the letter of your second, third fourth and fifth choice in the place provided:

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

END OF TRAINING SCRIPT

Appendix 1 Part C: The 1997 - 1998 Experimental Instrument

Tax Case Y

The task is to file your income tax return. The correct amount of your income tax is uncertain because the correct amount of one item you could claim a rebate on is in doubt.

You must choose the amount of this item to report.

Your taxable income is \$23,256 not counting this item. **You have already made PAYE payments totalling \$5,400** which is **\$400 too much** on your income (ignoring the possible rebate).

In **Option A** you do not claim the rebate, and there is no risk of under-reporting your tax.

In **Options B, C, D,** and **E** you claim more and more of the rebate item's cost, and both your refund and also your chance of under-reporting increases.

The tax authorities will consider a disallowed rebate in the same light as under-reported tax. The cost if tax is under-reported is **unpaid taxes plus \$300**.

The risk of under-reporting your tax is shown in the lower part of the table, and the cost to you is shown in the bottom line.

Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this rebate item to claim. Circle the Option you prefer, and raise your hand to receive your refund.

Then fill in the list below before moving on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
REFUND CLAIMED	REFUND \$400	REFUND \$500	REFUND \$600	REFUND \$700	REFUND \$800
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

- My second choice would have been: _____
- My third choice would have been: _____
- My fourth choice would have been: _____
- My fifth choice would have been: _____

Report for the Inland Revenue Department

Tax Case Z

The task is to file your income tax return. The correct amount of your income tax is uncertain because you are not sure how much exactly you earned on one item of income. You must choose the amount of this item to report.

Your taxable income is \$26,977 not counting this item. You have already made provisional tax payments totalling \$4,800.

In **Option A** you include all possible income from the uncertain item, and there is no risk of under-reporting your tax.

In **Options B, C, D, and E**, you include less and less of this uncertain item income, and both your refund and your chance of under-reporting increases.

The cost if under-reported is unpaid taxes plus \$300.

The risk of under-reporting your tax is shown along the bottom of the table along with the possible costs.

Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this item to deduct. Circle the Option you prefer. If that Option requires a payment, make the payment into the PAYMENT ENVELOPE.

If your Option has a refund, your supervisor will give you the refund.

After filling in your order of preference in the place for it below the box, go on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT INCLUDED	ALL	MOST	HALF	SOME	NONE
REFUND OR PAYMENT DUE	PAYMENT \$200	PAYMENT \$100	NONE \$0	REFUND \$100	REFUND \$200
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Framing Effects and Taxpayer Risks when Filing Tax Returns

Tax Case X

The task is to file your income tax return. The correct amount of your income tax is uncertain because the correct amount of one business expense is in doubt.

You must choose the amount of this expense to report. **Your taxable income is \$28,837 — NOT counting this expense.**

You have already made provisional tax payments totalling \$9,621, which is \$800 short of what you would be expected to pay on \$28,837 if the expense is ignored.

In **Option A** you deduct none of this expense, and there is no risk of under-reporting your tax.

In **Options B, C, D,** and **E** you deduct more and more of this expense, and your payment declines but your chance of under-reporting increases.

The cost if under-reported is unpaid taxes plus \$300.

The risks and costs of under-reporting your tax are laid out at the bottom of the table.

Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this item to deduct. Circle the Option you prefer, and put your tax payment in your PAYMENT ENVELOPE.

After filling in your preference order in the place below the box, go on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
PAYMENT DUE	PAYMENT \$800	PAYMENT \$700	PAYMENT \$600	PAYMENT \$500	PAYMENT \$400
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Report for the Inland Revenue Department

Choose a gamble

Your task is to choose one of the five gambles below.

If you choose **Option A**, the outcome will be certain, and you will later pay \$200 for sure.

In **Options B, C, D, and E** you will receive either the more favourable outcome OR the less favourable outcome depending on the spin of the wheel at the end of the session.

In **Options B, C, D, and E**, the more favourable outcome is increasingly more favourable, but your chance of getting the more favourable payoff decreases.

Circle your preferred gamble. (No money is paid or given till the end when the chips are drawn.) Then go on to the next case.

GAMBLES -- Circle One

OPTIONS	CHANCE	WIN/ PAY	AMOUNT
(A)	100%	PAY	\$200
(B)	85%	PAY	\$100
	15%	PAY	\$500
(C)	75%	PAY	\$0
	25%	PAY	\$500
(D)	67%	WIN	\$100
	33%	PAY	\$500
(E)	60%	WIN	\$200
	40%	PAY	\$500

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Framing Effects and Taxpayer Risks when Filing Tax Returns

Paying Medical Insurance

The task is to pay medical insurance to cover your family. Your employer pays for part of the plan, and you pay the rest.

You choose from among five insurance policies which differ in the medical services covered.

Policy A is the full coverage policy.

In **Options B, C, D** and **E**, you opt for policies which have fewer and fewer covered services. If no one in your family needs any of the uncovered services, then the cheaper policies provide coverage as good as that of **Policy A**.

If you choose **Policy A**, there is no risk of additional costs, but **Policy A** costs you more.

In **Options B, C, D**, and **E** the cost of medical insurance goes down for you. But (as luck would have it!) the chance that someone in your family will need uncovered medical services (costing you additional money) increases.

The risk of added cost is **15%** in Option **B**, **25%** in Option **C**, **33%** in Option **D**, and **40%** in Option **E**.

The chart shows your cost as well as the risk and cost of needing uncovered services for each Insurance Policy Plan. Circle the Plan you prefer, and put your insurance premium in your payment envelope. After filling in your preference order in the place below the box, go on to the next case.

HEALTH CARE OPTIONS--Circle One

POLICIES	(A) PLAN A	(B) PLAN B	(C) PLAN C	(D) PLAN D	(E) PLAN E
YOUR COST	\$800	\$700	\$600	\$500	\$400
RISK AND COST OF UNCOVERED SERVICES					
RISK	0%	15%	25%	33%	40%
YOUR COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

ADDITIONAL RATINGS OF JUDGMENT SITUATIONS

On this page, please prepare two additional ratings for five of these Judgment Situations.

Please indicate how significant you considered the facts of these two scenarios to be to you by ticking the most appropriate box:

1. My choice of option was influenced by the level of PAYE said to be withheld in **Tax Case Y:**

- Not at all — I ignored it.
- Only in a slight fashion
- It was significant in my thinking
- It was quite important
- Of major importance — it totally shaped my thinking.

2. My choice of option was influenced by the level of provisional tax said to be withheld in **Tax Case X:**

- Not at all — I ignored it.
- Only in a slight fashion
- It was significant in my thinking
- It was quite important
- Of major importance — it totally shaped my thinking.

Questionnaire

The purpose of this questionnaire is to provide a background of solicited opinions for statistical comparison with the responses the entire group has made to the five scenarios.

The answers you make are completely confidential; and you personally will not be able to be identified in any way.

Please tick only one box for each question:

Appendix 1 Part D: The 1997 Questionnaire

Gender:

- Male Female

Age:

Please tick the box which covers your age group

- 18 - 20 21 - 25
 26 - 30 31 - 40
 41 - 60 >60

Tax filing experience in years:

Please tick the box which covers the approximate number of years you have filed tax returns in New Zealand or elsewhere:

- 1 - 5 6 -10
 11 - 15 16 - 20
 >20

Attitude to health insurance:

Given the current state of the public health system in New Zealand, how worthwhile do you consider a personal health insurance scheme to be for you or other members of your family?:

Please tick the box which most closely approximates your judgement of it:

- It is ridiculous
 It is not very necessary
 I am neither for nor against
 I think it is a reasonable thing to have
 I would not be without it

Attitude to fairness of tax with respect to changes in the public health system:

Given the level of tax levied at present in New Zealand, do you consider that changes in the public health system are:

- unacceptable
 have some, but overall questionable merit
 undecided
 are basically OK, but have some flaws
 acceptable

Report for the Inland Revenue Department

Attitude to non-compliance #1:

Given the tax laws that are in place in New Zealand at the present time, would you consider it acceptable for a taxpayer earning over \$35,000 to under-report income that he/she would have the power to conceal?

- never
- seldom
- on average
- mostly
- always

Attitude to non-compliance #2:

Given the tax laws that are in place in New Zealand at the present time, would you consider it acceptable for a taxpayer earning less than (say) \$18,000 to under-report income that he/she would have the power to conceal?

- never
- seldom
- on average
- mostly
- always

Feeling about actual taxpaying:

When you have found yourself in the position of owing more tax to the IRD, which single box of the following would come closest to most accurately describing what you have experienced:

- I am very unhappy: This is a loss to me and an imposition
- This is something I feel moderately unhappy about; but it is necessary
- No strong feeling
- I'm moderately happy to do the right thing
- I'm happy to fulfil this requirement: it is my contribution to society

Frequency of refund-due and payment-due tax filings:

When you have filed your annual income tax return a **rough estimate** of the times you have had to make a tax payment to the IRD or similar tax authority elsewhere would be:

- | | |
|---|--|
| <input type="checkbox"/> never | <input type="checkbox"/> 20% of years filed |
| <input type="checkbox"/> 40% of years filed | <input type="checkbox"/> 60% of years filed |
| <input type="checkbox"/> 80% of years filed | <input type="checkbox"/> 100% of years filed |
| <input type="checkbox"/> Don't know | |

[Please turn over]

Framing Effects and Taxpayer Risks when Filing Tax Returns

Perception of likelihood of an audit by the tax authorities:

At present you believe that the IRD fully audits (as distinct from just checking the arithmetic) what proportion of tax returns that cross its desks? Tick the box which most closely approximates your own estimate:

- | | | |
|-------------------------------------|-------------------------------------|--------------------------------------|
| <input type="checkbox"/> 1 percent | <input type="checkbox"/> 5 percent | <input type="checkbox"/> 10 percent |
| <input type="checkbox"/> 15 percent | <input type="checkbox"/> 20 percent | <input type="checkbox"/> 25 percent |
| <input type="checkbox"/> 30 percent | <input type="checkbox"/> 35 percent | <input type="checkbox"/> 40 percent |
| <input type="checkbox"/> 45 percent | <input type="checkbox"/> 50 percent | <input type="checkbox"/> 55 percent |
| <input type="checkbox"/> 60 percent | <input type="checkbox"/> 65 percent | <input type="checkbox"/> 70 percent |
| <input type="checkbox"/> 75 percent | <input type="checkbox"/> 80 percent | <input type="checkbox"/> 85 percent |
| <input type="checkbox"/> 90 percent | <input type="checkbox"/> 95 percent | <input type="checkbox"/> 100 percent |

Feelings about Gambling:

This question is about how you view the rights and wrongs of gambling. Your attitude to spending say \$5 a week on a Lotto ticket is most closely approximated by which single box:

- I would never buy a ticket because gambling is always wrong
- I am happy to support a charity that funds good causes; but I consider regular ticket-buying to be not right for me
- I do not have an opinion either way
- I am quite happy to have a regular flutter of this sort; but if Lotto was banned, I would not miss it.
- I feel good about playing Lotto and would resent it if it were banned

Household income #1:

How would you describe the household in which you live (including benefits/ pensions/ official income support). Note that if you are flatting with people you would not consider all to be your family, opt for whichever box best describes you and your family:

- The household has one income-earner
- The household has two income earners
- Other.

Household income #2:

If total household income is defined as your income and the income of your partner/spouse added together then a ball-park figure of your household income would be in the range of:

- Less than \$20,000
- \$20,000 to \$30,000
- \$30,001 to \$40,000
- \$40,001 to \$50,000
- > \$50,000.

Report for the Inland Revenue Department

Nature of Income Earning Experience:

Which of the following best describes your major income-earning experience:

- State service or SOE employee
- Private sector employee
- Self employed (No employees - with exception that spouse may work with you)
- Self employed (You also employ non-family members)
- I am not directly an earner since my main role is managing the household or caring for the family.
- Other: Please state: _____

Education:

For this question, tick **every** box which applies to you. Which of the following describes your educational history:

- School education
- Completed a polytechnic qualification
- Completed a university qualification
- Completed some other form of tertiary education qualification
- Self-taught in your area of expertise

Awareness of general compliance with tax laws:

You believe (or have at least the gut feeling) that taxpayers in general, where they have freedom of action to do so, will tend to:

- Fully report all taxable income to the very last cent
- Report all taxable income give or take the last few dollars
- Sometimes under-report taxable income
- Usually under-report taxable income
- Under report as much and as often as they possibly can.

Professional tax-filing assistance:

This question is about whether you seek professional advice from an accountant or other tax return preparer. (If you own/manage a company and have responsibility for the company tax return, treatment of the company return is covered in this question.):

- I always prepare my tax return (or with my spouse/partner)
- I sometimes pay a professional to prepare my tax return
- I usually pay a professional to prepare my tax return
- I always pay a professional to prepare my tax return

Framing Effects and Taxpayer Risks when Filing Tax Returns

Knowledge of theories of decision making under risk and under uncertainty #1:

How would you describe your knowledge of Von Neumann and Morgenstern's *Expected Utility Theory*:

- I was totally unaware of it
- I have heard the name but don't know the details
- I am moderately aware of the basic concepts
- I have studied this theory in the past.

Knowledge of theories of decision making under risk and under uncertainty #2:

How would you describe your knowledge of Kahneman and Tversky's *Prospect Theory*:

- I was totally unaware of it
- I have heard the name but don't know the details
- I am moderately aware of the basic concepts
- I have studied this theory in the past.

Before answering this final question, please make sure a supervisor has processed your results:

Intention regarding earnings from this session.

- I intend to receive the cash to dispose of as I see fit
- I require you to forward the cash on my behalf to my designated charity
- I did not end up with a positive balance and have no experiment earnings to allocate either way.

Report for the Inland Revenue Department

Appendix 1 Part E: Financial Position Record

Record Sheet

Case	Option chosen	Risk level	Chip drawn	
Tax Case Y				
Medical Insurance				
Tax Case X				
Gamble				
Tax Case Z				
AMOUNT IN FUND AT END:				
Amount owed to: me/charity .....(delete non-applicable)				

AMOUNT IN FUND AT END:	
Amount owed to: me/charity .....(delete non-applicable)	

Appendix 1 Part F: Debriefing Document

What this was all about (in brief.)

As you will have gathered from the experience you have just had, the main issue in this experiment was how people evaluate the choices they have to make in various financial contexts. You have just worked through three tax scenarios, a medical insurance scenario, and a gamble. The research question was, do people treat these quite different financial undertakings in an identical fashion, or do they approach each in a measurably different fashion? In particular the scenarios were set up in such a way that the predictions of *Expected Utility Theory* (from the discipline of Economics) and *Prospect Theory* (from the discipline of Psychology) could be tested in a tax-paying context. The three ethical crisis questions were designed to throw further light on how various possible concepts of fairness impact on decisions made in these five scenarios.

As stated at the start of the session, there is **no traceable connection** between anybody's individual results in this experiment and the Inland Revenue Department. Your anonymity is fully guaranteed.

Nevertheless you have the right to withdraw from the experiment even at this point if you feel uncomfortable about having participated. If you withdraw, your data, of course, cannot be used.

To complete the data we need to complete the experiment, so please fill in the questionnaire.

The full experiment will not be processed and written up until November (June). When it is in its final form we will be happy to explain the overall findings in depth and detail with any of you who want a proper follow-up.

**Adrian Sawyer
Warwick Anderson**

**C/- the Department of Accountancy, Finance and Information Systems
University of Canterbury
Private Bag 4800
Christchurch.**

Ph (03) 364-2617.

Appendix 1 Part G: The 1995 Tax Decision Problems

TAX CASE Y (1995)

The task is to file your income tax return. The correct amount of your income tax is uncertain because the correct amount of one item you could claim a rebate on is in doubt.

You must choose the amount of this item to report.

Your taxable income is \$24,166 not counting this item. **You have already made PAYE payments totalling \$5,400** which is **\$400 too much** on your income (ignoring the possible rebate).

In **Option A** you do not claim the rebate, and there is no risk of under-reporting your tax.

In **Options B, C, D, and E** you claim more and more of the rebate item's cost, and both your refund and also your chance of under-reporting increases.

The tax authorities will consider a disallowed rebate in the same light as under-reported tax. The cost if tax is under-reported is **unpaid taxes plus \$300**.

The risk of under-reporting your tax is shown in the lower part of the table, and the cost to you is shown in the bottom line.

Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this rebate item to claim. Circle the Option you prefer, and raise your hand to receive your refund. Then fill in the list below before moving on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
REFUND CLAIMED	REFUND \$400	REFUND \$500	REFUND \$600	REFUND \$700	REFUND \$800
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Framing Effects and Taxpayer Risks when Filing Tax Returns

TAX CASE Z (1995)

The task is to file your income tax return. The correct amount of your income tax is uncertain because you are not sure how much exactly you earned on one item of income. You must choose the amount of this item to report.

Your taxable income is \$25,780 not counting this item. **You have already made provisional tax payments totalling \$4,800.**

In **Option A** you include all possible income from the uncertain item, and there is no risk of under-reporting your tax.

In **Options B, C, D, and E**, you include less and less of this uncertain item income, and both your refund and your chance of under-reporting increases.

The cost if under-reported is unpaid taxes plus \$300.

The risk of under-reporting your tax is shown along the bottom of the table along with the possible costs.

Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this item to deduct. Circle the Option you prefer. If that Option requires a payment, make the payment into the PAYMENT ENVELOPE.

If your Option has a refund, your supervisor will give you the refund.

After filling in your order of preference in the place for it below the box, go on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT INCLUDED	ALL	MOST	HALF	SOME	NONE
REFUND OR PAYMENT DUE	PAYMENT \$200	PAYMENT \$100	NONE \$0	REFUND \$100	REFUND \$200
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Report for the Inland Revenue Department

TAX CASE X (1995)

The task is to file your income tax return. The correct amount of your income tax is uncertain because the correct amount of one business expense is in doubt.

You must choose the amount of this expense to report. **Your taxable income is \$40,000 — NOT counting this expense.**

You have already made provisional tax payments totalling \$9,621, which is \$800 short of what you would be expected to pay on \$40,000 if the expense is ignored.

In **Option A** you deduct none of this expense, and there is no risk of under-reporting your tax.

In **Options B, C, D, and E** you deduct more and more of this expense, and your payment declines but your chance of under-reporting increases.

The cost if under-reported is unpaid taxes plus \$300.

The risks and costs of under-reporting your tax are laid out at the bottom of the table. Consider both the risk of under-reporting and the dollar amounts in choosing the amount of this item to deduct. Circle the Option you prefer, and put your tax payment in your **PAYMENT ENVELOPE**.

After filling in your preference order in the place below the box, go on to the next case.

TAX FILING OPTIONS--Circle One

	(A)	(B)	(C)	(D)	(E)
AMOUNT DEDUCTED	NONE	SOME	HALF	MOST	ALL
PAYMENT DUE	PAYMENT \$800	PAYMENT \$700	PAYMENT \$600	PAYMENT \$500	PAYMENT \$400
RISK & COST OF UNDERPAYMENT					
RISK	0%	15%	25%	33%	40%
TOTAL COST	\$0	\$400	\$500	\$600	\$700

My second choice would have been: _____

My third choice would have been: _____

My fourth choice would have been: _____

My fifth choice would have been: _____

Appendix 2: 1997 - 1998 Recruitment Letters

The communications used in recruiting participants from the second list of Christchurch taxpayers are typical of the sets of communications used with respect to the other two randomly generated 1997 - 1998 samples. The documents were modified with respect to venue and contact information in the case of the sample of Wellington taxpayers. In the initial communication with people on the first Christchurch list, there was no tick box soliciting the mailing of a refusal notification by those who had decided not to participate. A self-addressed reply-paid

Recruitment letter template used in the generation of the second Christchurch sample in the 1997-1998 study



Department of Accountancy, Finance and Information Systems University of Canterbury

Adrian Sawyer EMail Address: A.Sawyer@afis.canterbury.ac.nz
Private Bag 4800 Christchurch New Zealand 8020
Direct phone 64-3-364-2617 Fax 64-3-364-2727

5 January 1998

«Title» «Given_Name» «Family_Name»
«Address»

Dear «Title» «Family_Name»,

We are running a social laboratory experiment as part of a research project investigating aspects of taxpayers' behaviour. The topic relates to how people make personal financial decisions in areas such as payment of tax and selection of medical insurance. It is a replication and extension of an experiment which was conducted in the United States and written up in 1994. The aim is to build up a profile of how people in general handle risky decisions where the outcomes are not known in advance.

We obtained your name by a process of random selection on the basis that you are a taxpayer living in the Christchurch region. The research is entirely controlled by the researchers who have no direct links with the IRD, apart from a contribution to some of the costs.

We were wondering if you would be willing to offer your time for about an hour and one half (up to a maximum two hours) to participate in the experiment. It involves reading through a number of situations and making a financial decision in each case. The situations primarily involve tax and medical insurance.

Our experiment is a paying proposition for you in that it incorporates a real monetary incentive. In brief you could reasonably be expected to receive on average about \$5 for your efforts, although this may be increased or decreased by what you as a participant may 'earn' as it were, in the course of the experiment. You would either gain or miss out on amounts of money as a result of the decisions you make just as in real life. This, we hope, makes it more likely that the scenarios given during the experiment will have greater realism for you.

Report for the Inland Revenue Department

There is the possibility of losses as well as gains, but should you make a loss, you will not be expected to pay the loss; rather you will end up without any payment for the session. We want to ensure as far as we can that no one ends up feeling unfairly treated.

What we propose is that you would work through the experimental scenarios as a learning experience for yourself and/or as a contribution to scientific research. This research which will benefit New Zealanders by improving our understanding of how financial decision-making relates to uncertainty, particularly when tax decisions may be highly contentious and the difference between right and what is wrong cannot be known in advance.

The money you earn would be payable either to you in cash or will be directed to a charitable organisation of your choice from a specified selection. The cash payment will be made either at the end of the session or will be sent to you or to the charity concerned at the conclusion of the experimental sessions. The payment does not need to be declared as income for tax purposes.

If you wish to participate, please indicate your choice of session as set out below. The venue for the experiment is the Commerce Building, Level 1, at the University of Canterbury (please refer to the enclosed map for location). The optimum time of the day would be 7.30 - 9pm on a weekday, or if you cannot attend at this time, then 10-11.30 on a Saturday morning is workable for us. You should be over 18 years of age and have had some experience filing tax returns.

If participating, please complete the details requested on the next page and enclose this in the reply paid envelope. Please retain this letter for your records. Unless you hear from us, then please attend at the time of your choice. If you are not able to participate, please return the form, stating this on it.

We look forward to receiving your response in the enclosed reply paid envelope and to seeing you during the experiment sessions. Should you want to discuss this proposal further, then please feel free to contact, in confidence, Adrian Sawyer, on 364-2617.

Yours faithfully,

Warwick Anderson and Adrian Sawyer
Principal Researchers, University of Canterbury



**Department of Accountancy, Finance
and Information Systems**

University of Canterbury

Adrian Sawyer EMail Address: A.Sawyer@afis.canterbury.ac.nz
Private Bag 4800 Christchurch New Zealand 8020
Direct phone 64-3-364-2617 Fax 64-3-364-2727

I would like to participate in this experiment (please tick a box): YES NO

(If NO, please include your name, but ignore the rest when mailing this back.)

My Name is: _____

My Address is _____

My contact telephone number is: (Daytime)_____ (Evenings) _____

I would like to attend and participate, and have any payment applied as follows:

Available Times	Please tick one	Payment Options	Please tick one
Saturday 24 January (10 - 11.30am)		In cash	
Monday 26 January (7.30 - 9pm)		To Charity	
Tuesday 27 January (7.30 - 9pm)		New Zealand Sports Foundation (Inc.)	
Wednesday 28 January (7.30 - 9pm)		Plunket Society	
Thursday 29 January (7.30 - 9pm)		The Cancer Society	
Friday 30 January (7.30 - 9pm)		World Vision of New Zealand	
		Other (please specify)_____.	

Please enclose this form in the reply paid envelope. Thank you for your time and willingness to participate.

Warwick Anderson and Adrian Sawyer

Follow-up Letter used in the recruitment of the second Christchurch sample



***Department of Accountancy, Finance
and Information Systems
University of Canterbury***

Adrian Sawyer EMail Address: A.Sawyer@afis.canterbury.ac.nz
Private Bag 4800 Christchurch New Zealand 8020
Direct phone 64-3-364-2617 Fax 64-3-364-2727

20 January 1998

«Title» «Given_Name» «Family_Name»
«Address»

Dear «Title» «Family_Name»,

We sent a letter and accompanying materials to you on 5 January 1998 concerning a social laboratory experiment. While you may have overlooked the original letter or misplaced it, we are keen to have your participation in the research.

Briefly to summarise our earlier letter. We are running a social laboratory experiment as part of a research project investigating aspects of taxpayers' behaviour. The topic relates to how people make personal financial decisions in areas such as payment of tax and selection of medical insurance. The aim is to build up a profile of how people in general handle risky decisions where the outcomes are not known in advance. It involves reading through a number of situations and making a financial decision in each case.

This research which will benefit New Zealanders by improving our understanding of how financial decision-making relates to uncertainty, particularly when tax decisions may be highly contentious and the difference between right and what is wrong cannot be known in advance.

We have enclosed another copy of the sheet on which we would like you to indicate your choice of session. The venue for the experiment is the Commerce Building, Level 1, at the University of Canterbury (please refer to the map enclosed with the first letter for location). If you have misplaced this map and do not know where the Commerce building is located, please call, in confidence, Adrian Sawyer on 3642-617.

Please complete the details requested on the next page even if unable to participate and enclose this in the reply paid envelope which was enclosed with the original letter. If you have misplaced this envelope, you may call the researchers to advise of your preferred time and payment option, and bring the sheet with your preferences to the session. Unless you hear from us, then please attend at the time of your choice.

Framing Effects and Taxpayer Risks when Filing Tax Returns

We look forward to receiving your response and seeing you during the experiment sessions. Should you want to discuss this proposal further, then please feel free to contact, in confidence, Adrian Sawyer, on 364-2617.

Yours faithfully,

Warwick Anderson and Adrian Sawyer
Principal Researchers, University of Canterbury

Appendix 3

Part A: Repeated Measures GLM Analysis of Variance Tests

A1: Tests for Main and Interaction Effects

Appendix 3 Table 1: Tests for Main and Interaction Effects on the Five Scenarios, Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Tests of Hypotheses for Between Subjects Effects					
Source	DF	Type III SS	Mean Square	F Value Pr > F	
GROUP	6	14.33198551	2.38866425	0.82	0.5564
FLOAT	2	0.92572567	0.46286283	0.16	0.8532
GROUP*FLOAT	2	0.25376569	0.12688285	0.04	0.9574
ORDER	19	41.35846741	2.17676144	0.75	0.7608
GROUP*ORDER	35	56.76656614	1.62190189	0.56	0.9744
FLOAT*ORDER	21	41.99715213	1.99986439	0.69	0.8367
GROUP*FLOAT*ORDER	2	5.44414226	2.72207113	0.94	0.3958
Error	101	293.93380952	2.91023574		
PANEL B					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value Pr > F	
CASE	4	68.49471348	17.12367837	13.44	0.0001
CASE*GROUP	24	38.17954078	1.59081420	1.25	0.1957
CASE*FLOAT	8	12.24041249	1.53005156	1.20	0.2971
CASE*GROUP*FLOAT	8	5.84037657	0.73004707	0.57	0.8003
CASE*ORDER	76	115.38814280	1.51826504	1.19	0.1472
CASE*GROUP*ORDER	140	162.58738398	1.16133846	0.91	0.7395
CASE*FLOAT*ORDER	84	114.54407364	1.36361992	1.07	0.3306
CASE*GROUP*FLOAT*ORDER	8	12.65209205	1.58151151	1.24	0.2736
Error(CASE)	404	514.88285714	1.27446252		
PANEL C					
Adjusted Pr > F Statistics with Respect to Univariate Tests of Hypotheses for Within Subject Effects:					
Greenhouse-Geisser Epsilon and the Huynh-Feldt Epsilons					
Source	G - G		H - F		
CASE	0.0001		0.0001		
CASE*GROUP	0.2002		0.1957		
CASE*FLOAT	0.2988		0.2971		
CASE*GROUP*FLOAT	0.7923		0.8003		
CASE*ORDER	0.1525		0.1472		
CASE*GROUP*ORDER	0.7342		0.7395		
CASE*FLOAT*ORDER	0.3337		0.3306		
Whole Model	0.9531		1.8484		

Appendix 3 Table 2: Tests for Main and Interaction Effects on the Five Scenarios, 1997 - 1998 Random Sample (N = 60).

Categorical Variables: GROUP, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Tests of Hypotheses for Between Subjects Effects					
Source	DF	Type III SS	Mean Square	F Value Pr > F	
GROUP	2	9.36898311	4.68449155	1.37	0.2645
ORDER	3	8.82590810	2.94196937	0.86	0.4689
GROUP*ORDER	6	10.98097537	1.83016256	0.53	0.7795
Error	48	164.42380952	3.42549603		
PANEL B					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value Pr > F	
CASE	4	56.41477869	14.10369467	12.03	0.0001
CASE*GROUP	8	9.90635993	1.23829499	1.06	0.3957
CASE*ORDER	12	7.31865232	0.60988769	0.52	0.9001
CASE*GROUP*ORDER	24	32.80867752	1.36702823	1.17	0.2779
Error(CASE)	192	225.10952381	1.17244544		
PANEL C					
Adjusted Pr > F Statistics with Respect to Univariate Tests of Hypotheses for Within Subject Effects:					
Greenhouse-Geisser Epsilon and the Huynh-Feldt Epsilons					
Source:		G - G		H - F	
CASE		0.0001		0.0001	
CASE*GROUP		0.3948		0.3957	
CASE*ORDER		0.8882		0.9001	
CASE*GROUP*ORDER		0.2840		0.2779	
Whole Model		0.9176		1.2307	

A2: Tests on Hypothesis One

Appendix 3 Table 3: Refund Tax Case Y and High Pay Tax Case X, Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	9.12722140	9.12722140	7.71	0.0065
CASE*GROUP	6	2.41957698	0.40326283	0.34	0.9137
CASE*FLOAT	2	7.70308332	3.85154166	3.26	0.0427
CASE*GROUP*FLOAT	2	0.00125523	0.00062762	0.00	0.9995
CASE*ORDER	19	16.78727448	0.88354076	0.75	0.7621
CASE*GROUP*ORDER	35	22.55106601	0.64431617	0.54	0.9785
CASE*FLOAT*ORDER	21	21.82303762	1.03919227	0.88	0.6182
CASE*GROUP*FLOAT*ORDER	2	1.30564854	0.65282427	0.55	0.5777
Error(CASE)	101	119.49761905	1.18314474		
PANEL B					
Response Variable	N	Mean			
Refund Tax Case Y	192	2.27604167			
High Pay Tax Case X	192	2.83333333			

Appendix 3 Table 4: Refund Tax Case Y and High Pay Tax Case X, 1997-1998 Random Sample (N = 60).

Categorical Variables: GROUP, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	14.51011854	14.51011854	11.14	0.0016
CASE*GROUP	2	0.45312286	0.22656143	0.17	0.8408
CASE*ORDER	3	0.84923225	0.28307742	0.22	0.8839
CASE*GROUP*ORDER	6	4.30194322	0.71699054	0.55	0.7670
Error(CASE)	48	62.50595238	1.30220734		
PANEL B					
Response Variable	N	Mean			
Refund Tax Case Y	60	2.23333333			
High Pay Tax Case X	60	2.93333333			

A3: Tests on Hypothesis Two

Appendix 3 Table 5: High Pay Tax Case X and the Health Insurance Case, Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.89341181	0.89341181	0.68	0.4125
CASE*GROUP	5	3.96467469	0.79293494	0.60	0.6993
CASE*FLOAT	2	1.01656227	0.50828113	0.39	0.6813
CASE*GROUP*FLOAT	2	2.12139121	1.06069561	0.80	0.4505
CASE*ORDER	19	31.94076894	1.68109310	1.27	0.2176
CASE*GROUP*ORDER	33	54.86280449	1.66250923	1.26	0.1909
CASE*FLOAT*ORDER	21	39.82880392	1.89660971	1.44	0.1190
CASE*GROUP*FLOAT*ORDER	2	4.50632845	2.25316423	1.71	0.1865
Error(CASE)	101	133.27738095	1.31957803		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	192	2.83333333			
Health Insurance Case	192	2.59895833			

Appendix 3 Table 6: High Pay Tax Case X and the Health Insurance Case, 1997 - 1998 Random Sample (N = 60).

Categorical Variables: GROUP, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.04176801	0.04176801	0.03	0.8527
CASE*GROUP	2	1.83027547	0.91513773	0.76	0.4717
CASE*ORDER	3	1.87502805	0.62500935	0.52	0.6697
CASE*GROUP*ORDER	6	8.17069747	1.36178291	1.14	0.3563
Error(CASE)	48	57.55238095	1.19900794		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	60	2.93333333			
Health Insurance Case	60	2.98333333			

Appendix 3 Table 7: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS), Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, ORDER, MEDINS

PANEL A

**General Linear Models Procedure Repeated Measures Analysis of Variance
Univariate Tests of Hypotheses for Within Subject Effects**

Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.00192343	0.00192343	0.00	0.9694
CASE*GROUP	5	2.61287773	0.52257555	0.40	0.8464
CASE*FLOAT	2	1.04856335	0.52428168	0.40	0.6696
CASE*GROUP*FLOAT	2	0.90000000	0.45000000	0.35	0.7086
CASE*ORDER	19	26.86201377	1.41379020	1.09	0.3790
CASE*GROUP*ORDER	23	33.98215356	1.47748494	1.14	0.3269
CASE*FLOAT*ORDER	15	28.29920552	1.88661370	1.45	0.1435
CASE*GROUP*FLOAT*ORDER	0	.	.	.	.
CASE*MEDINS	1	4.47300491	4.47300491	3.44	0.0672
CASE*GROUP*MEDINS	4	2.02834099	0.50708525	0.39	0.8155
CASE*FLOAT*MEDINS	1	0.42666667	0.42666667	0.33	0.5684
CASE*GROUP*FLOAT*MEDINS	0	.	.	.	.
CASE*ORDER*MEDINS	5	8.96721805	1.79344361	1.38	0.2406
CASE*GROUP*ORDER*MEDINS	2	2.84437359	1.42218679	1.09	0.3399
CASE*FLOAT*ORDER*MEDINS	0	.	.	.	.
CASE*GROU*FLOA*ORDE*MEDIN	0	.	.	.	.
Error(CASE)	85	110.60000000	1.30117647		

Note: Insufficient degrees of freedom for determining the following interaction effects:
CASE*GROUP*FLOAT*ORDER, CASE*GROUP*FLOAT*MEDINS,
CASE*FLOAT*ORDER*MEDINS, CASE*GROUP*FLOAT*ORDER*MEDINS

PANEL B

Response Variable	N	Mean
High Pay Tax Case X	192	2.83333333
Health Insurance Case	192	2.59895833

Note: Means are identical with those reported in Table 5

Appendix 3 Table 8: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS), Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, MEDINS					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.37147147	0.37147147	0.26	0.6123
CASE*GROUP	5	2.76645332	0.55329066	0.38	0.8593
CASE*FLOAT	2	0.74023052	0.37011526	0.26	0.7738
CASE*GROUP*FLOAT	2	0.58340947	0.29170473	0.20	0.8169
CASE*MEDINS	1	12.43448814	12.43448814	8.63	0.0038
CASE*GROUP*MEDINS	5	8.36001100	1.67200220	1.16	0.3308
CASE*FLOAT*MEDINS	2	0.14336519	0.07168260	0.05	0.9515
CASE*GROUP*FLOAT*MEDINS	2	0.11288809	0.05644404	0.04	0.9616
Error(CASE)	170	244.96209402	1.44095349		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	192	2.83333333			
Health Insurance Case	192	2.59895833			
Note: Means are identical with those reported in Table 5					

Appendix 3 Table 9: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS), 1997 - 1998 Random Sample (N = 60).

Categorical Variables: GROUP, MEDINS					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	2.55700726	2.55700726	2.22	0.1422
CASE*GROUP	2	0.15261388	0.07630694	0.07	0.9360
CASE*MEDINS	1	5.29670575	5.29670575	4.59	0.0366
CASE*GROUP*MEDINS	2	2.49663809	1.24831905	1.08	0.3459
Error(CASE)	54	62.25555556	1.15288066		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	60	2.93333333			
Health Insurance Case	60	2.98333333			
Note: Means are identical with those reported in Table 6					

Appendix 3 Table 10: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS), Combined Sample (N = 192).

Categorical Variables: GROUP, ORDER, MEDINS					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.00950497	0.00950497	0.01	0.9330
CASE*GROUP	6	3.95877520	0.65979587	0.49	0.8124
CASE*ORDER	19	26.71943887	1.40628626	1.05	0.4119
CASE*GROUP*ORDER	33	53.27931397	1.61452467	1.21	0.2346
CASE*MEDINS	1	0.89206413	0.89206413	0.67	0.4161
CASE*GROUP*MEDINS	5	2.38057034	0.47611407	0.36	0.8776
CASE*ORDER*MEDINS	8	17.92837510	2.24104689	1.67	0.1130
CASE*GROUP*ORDER*MEDINS	6	7.91273034	1.31878839	0.99	0.4390
Error(CASE)	107	143.21428571	1.33845127		
PANEL B					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Tests of Hypotheses for Between Subjects Effects					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
GROUP	6	9.61675006	1.60279168	0.96	0.4570
ORDER	19	27.09379714	1.42598932	0.85	0.6403
GROUP*ORDER	33	57.70766832	1.74871722	1.05	0.4174
MEDINS	1	0.15848481	0.15848481	0.09	0.7588
GROUP*MEDINS	5	9.54984315	1.90996863	1.14	0.3427
ORDER*MEDINS	8	23.69845267	2.96230658	1.77	0.0906
GROUP*ORDER*MEDINS	6	11.37679235	1.89613206	1.13	0.3477
Error	107	178.92857143	1.67222964		
PANEL C					
Response Variable	N	Mean			
High Pay Tax Case X	192	2.83333333			
Health Insurance Case	192	2.59895833			
Note: Means are identical with those reported in Table 5					

Appendix 3 Table 11: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS), 1997 - 1998 Random Sample (N = 60).

Categorical Variables: GROUP, ORDER, MEDINS					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value Pr > F	
CASE	1	1.48885742	1.48885742	1.34	0.2529
CASE*GROUP	2	0.32940092	0.16470046	0.15	0.8622
CASE*ORDER	3	1.49871970	0.49957323	0.45	0.7178
CASE*GROUP*ORDER	6	9.84758922	1.64126487	1.48	0.2082
CASE*MEDINS	1	3.04332268	3.04332268	2.75	0.1050
CASE*GROUP*MEDINS	2	1.65373631	0.82686816	0.75	0.4802
CASE*ORDER*MEDINS	2	5.10295037	2.55147519	2.30	0.1126
CASE*GROUP*ORDER*MEDINS	2	2.84437359	1.42218679	1.28	0.2877
Error(CASE)	41	45.39166667	1.10711382		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	60	2.93333333			
Health Insurance Case	60	2.98333333			
Note: Means are identical with those reported in Table Six					

Appendix 3 Table 12: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS): Partitioned Sample of those eschewing Private Insurance; Combined Years Sample (N = 40).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value Pr > F	
CASE	1	3.67949078	3.67949078	16.56	0.0066
CASE*GROUP	5	2.91467106	0.58293421	2.62	0.1360
CASE*FLOAT	1	1.19008264	1.19008264	5.36	0.0599
CASE*GROUP*FLOAT	1	0.00000000	0.00000000	0.00	1.0000
CASE*ORDER	13	20.52218064	1.57862928	7.10	0.0121
CASE*GROUP*ORDER	4	7.31686275	1.82921569	8.23	0.0130
CASE*FLOAT*ORDER	1	0.03571429	0.03571429	0.16	0.7024
CASE*GROUP*FLOAT*ORDER	0	.	.	.	.
Error(CASE)	6	1.33333333	0.22222222		
Note: Insufficient degrees of freedom for determining the following interaction effects: CASE*GROUP*FLOAT*ORDER					
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	40	2.70000000			
Health Insurance Case	40	3.17500000			

Appendix 3 Table 13: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS): Partitioned Sample of those favouring Private Insurance; Combined Years Sample (N = 152).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	7.85512970	7.85512970	5.68	0.0196
CASE*GROUP	5	7.34292330	1.46858466	1.06	0.3879
CASE*FLOAT	2	0.66757831	0.33378916	0.24	0.7862
CASE*GROUP*FLOAT	1	0.90000000	0.90000000	0.65	0.4223
CASE*ORDER	19	26.02561848	1.36976939	0.99	0.4811
CASE*GROUP*ORDER	22	29.05436454	1.32065293	0.95	0.5278
CASE*FLOAT*ORDER	14	28.26349124	2.01882080	1.46	0.1465
CASE*GROUP*FLOAT*ORDER	0	.	.	.	.
Error(CASE)	79	109.26666667	1.38312236		
Note: Insufficient degrees of freedom for determining the following interaction effects: CASE*GROUP*FLOAT*ORDER					
Panel B					
Response Variable	N	Mean			
High Pay Tax case X	152	2.86842105			
Health Insurance Case	152	2.44736842			

Appendix 3 Table 14: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS): Partitioned Sample of those eschewing Private Insurance; 1997 -1998 Random Sample (N = 12).

Categorical Variables: GROUP, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	4.62820513	4.62820513	21.36	0.0057
CASE*GROUP	2	1.39571695	0.69785847	3.22	0.1262
CASE*ORDER	2	1.12666667	0.56333333	2.60	0.1682
CASE*GROUP*ORDER	2	2.99333333	1.49666667	6.91	0.0364
Error(CASE)	5	1.08333333	0.21666667		
PANEL B					
Response Variable	N	Mean			
High Pay Tax Case X	12	2.58333333			
Health Insurance Case	12	3.41666667			

Appendix 3 Table 15: High Pay Tax Case X and the Health Insurance Case with respect to Response to Health Insurance Questionnaire Item (MEDINS): Partitioned Sample of those favouring Private Insurance, from 1997 - 1998 Random Sample(N = 48).

PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	0.80424757	0.80424757	0.65	0.4242
CASE*GROUP	2	1.87725989	0.93862994	0.76	0.4738
CASE*ORDER	3	1.66760516	0.55586839	0.45	0.7177
CASE*GROUP*ORDER	6	8.14597534	1.35766256	1.10	0.3796
Error(CASE)	36	44.30833333	1.23078704		

PANEL B		
Response Variable	N	Mean
High Pay Tax Case X	48	3.02083333
Health Insurance Case	48	2.87500000

A4: Tests on Hypothesis Three

Appendix 3 Table 16: Low Pay Tax Case Z and the Gamble Case, Combined Sample (N = 192).

Categorical Variables: GROUP, FLOAT, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source:	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	48.94508667	48.94508667	38.34	0.0001
CASE*GROUP	6	9.29044750	1.54840792	1.21	0.3059
CASE*FLOAT	2	1.29689033	0.64844516	0.51	0.6033
CASE*GROUP*FLOAT	2	0.86406904	0.43203452	0.34	0.7137
CASE*ORDER	19	25.13421919	1.32285364	1.04	0.4281
CASE*GROUP*ORDER	35	41.72141760	1.19204050	0.93	0.5791
CASE*FLOAT*ORDER	21	23.76021153	1.13143864	0.89	0.6083
CASE*GROUP*FLOAT*ORDER	2	1.55653766	0.77826883	0.61	0.5455
Error(CASE)	101	128.93690476	1.27660302		
PANEL B					
Response Variable	N	Mean			
Low Pay Tax Case Z	192	2.2500000			
Gamble Case	192	3.38541667			

Appendix 3 Table 17: Low Pay Tax Case Z and the Gamble Case, 1997 - 1998 Random Sample (N = 60).

Categorical variables: GROUP, ORDER					
PANEL A					
General Linear Models Procedure Repeated Measures Analysis of Variance					
Univariate Tests of Hypotheses for Within Subject Effects					
Source	DF	Type III SS	Mean Square	F Value	Pr > F
CASE	1	36.69099722	36.69099722	31.16	0.0001
CASE*GROUP	2	6.69753972	3.34876986	2.84	0.0680
CASE*ORDER	3	2.06667983	0.68889328	0.59	0.6277
CASE*GROUP*ORDER	6	8.49377716	1.41562953	1.20	0.3215
Error(CASE)	48	56.52023810	1.17750496		
PANEL B					
Response Variable	N	Mean			
Low Pay Tax Case Z	60	2.31666667			
Gamble Case	60	3.46666667			

Part B: Nonparametric Procedures

These were employed to test the null hypothesis that participants in 1997 - 1998 did not make decision problem choices with risk levels different from those chosen by the 1995 participants (with respect to the same decision problems) who were given a \$2100 cash float.

B1: NPAR1WAY Procedure: Brown-Mood k-Sample Median Test

Appendix 3 Table 18: Brown-Mood k-Sample Median Test for Variable CASEY.

N P A R 1 W A Y P R O C E D U R E					
Median Scores (Number of Points Above Median) for Variable CASEY Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	33.5853659	33.0	2.33816987	0.508869180
1997-1998	60	29.4146341	30.0	2.33816987	0.490243902
Average Scores Were Used for Ties					
Median 2-Sample Test (Normal Approximation) S = 29.4146 Z = -.250352 Prob > |Z| = 0.8023					
Median 1-Way Analysis (Chi-Square Approximation) CHISQ = 0.06268 DF = 1 Prob > CHISQ = 0.8023					

Appendix 3 Table 19: Brown-Mood k-Sample Median Test for Variable CASEX.

N P A R 1 W A Y P R O C E D U R E					
Median Scores (Number of Points Above Median) for Variable CASEX Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	33.2777778	33.0	2.44936014	0.504208754
1997-1998	60	29.7222222	30.0	2.44936014	0.495370370
Average Scores Were Used for Ties					
Median 2-Sample Test (Normal Approximation) S = 29.7222 Z = -.113408 Prob > |Z| = 0.9097					
Median 1-Way Analysis (Chi-Square Approximation) CHISQ = 0.01286 DF = 1 Prob > CHISQ = 0.9097					

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Appendix 3 Table 20: Brown-Mood k-Sample Median Test for Variable CASEM.

N P A R 1 W A Y P R O C E D U R E

Median Scores (Number of Points Above Median)
for **Variable CASEM**
Classified by Variable YEAR

YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	28.2368421	33.0000000	2.54641130	0.427830941
1997-1998	60	34.7631579	30.0000000	2.54641130	0.579385965

Average Scores Were Used for Ties

Median 2-Sample Test (Normal Approximation)
S = 34.7632 Z = 1.87054 Prob > |Z| = 0.0614

Median 1-Way Analysis (Chi-Square Approximation)
CHISQ = 3.4989 DF = 1 Prob > CHISQ = 0.0614

Appendix 3 Table 21: Brown-Mood k-Sample Median Test for Variable CASEZ.

N P A R 1 W A Y P R O C E D U R E

Median Scores (Number of Points Above Median)
for **Variable CASEZ**
Classified by Variable YEAR

YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	30.8918919	33.0000000	2.36845420	0.468058968
1997-1998	60	32.1081081	30.0000000	2.36845420	0.535135135

Average Scores Were Used for Ties

Median 2-Sample Test (Normal Approximation)
S = 32.1081 Z = 0.890078 Prob > |Z| = 0.3734

Median 1-Way Analysis (Chi-Square Approximation)
CHISQ = 0.79224 DF = 1 Prob > CHISQ = 0.3734

Appendix 3 Table 22: Brown-Mood k-Sample Median Test for Variable GAMBLE.

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N P A R 1 W A Y   P R O C E D U R E

Median Scores (Number of Points Above Median)
for Variable GAMBLE
Classified by Variable YEAR

YEAR          N          Sum of          Expected          Std Dev          Mean
              N          Scores          Under H0          Under H0          Score
1995          66          31.8709677      33.0000000        2.53528100       0.482893451
1997-1998     60          31.1290323      30.0000000        2.53528100       0.518817204
Average Scores Were Used for Ties

Median 2-Sample Test (Normal Approximation)
S = 31.1290      Z = 0.445328      Prob > |Z| = 0.6561

Median 1-Way Analysis (Chi-Square Approximation)
CHISQ = 0.19832      DF = 1      Prob > CHISQ = 0.6561
    
```

B2: Kruskal-Wallis test

Appendix 3 Table 23: Kruskal-Wallis test for Variable CASEY.

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N P A R 1 W A Y   P R O C E D U R E

Wilcoxon Scores (Rank Sums) for Variable CASEY
Classified by Variable YEAR

YEAR          N          Sum of          Expected          Std Dev          Mean
              N          Scores          Under H0          Under H0          Score
1995          66          4199.0          4191.0          195.791172        63.6212121
1997-1998     60          3802.0          3810.0          195.791172        63.3666667
Average Scores Were Used for Ties

Wilcoxon 2-Sample Test (Normal Approximation)
(with Continuity Correction of .5)

S = 3802.00      Z = -.038306      Prob > |Z| = 0.9694

T-Test Approx. Significance = 0.9695

Kruskal-Wallis Test (Chi-Square Approximation)
CHISQ = 0.00167      DF = 1      Prob > CHISQ = 0.9674
    
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Appendix 3 Table 24: Kruskal-Wallis test for Variable CASEX.

N P A R 1 W A Y P R O C E D U R E					
Wilcoxon Scores (Rank Sums) for Variable CASEX Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	4217.0	4191.0	198.384389	63.8939394
1997-1998	60	3784.0	3810.0	198.384389	63.0666667
Average Scores Were Used for Ties					
Wilcoxon 2-Sample Test (Normal Approximation) (with Continuity Correction of .5)					
S = 3784.00 Z = -.128538 Prob > |Z| = 0.8977					
T-Test Approx. Significance = 0.8979					
Kruskal-Wallis Test (Chi-Square Approximation) CHISQ = 0.01718 DF = 1 Prob > CHISQ = 0.8957					

Appendix 3 Table 25: Kruskal-Wallis test for Variable CASEM.

N P A R 1 W A Y P R O C E D U R E					
Wilcoxon Scores (Rank Sums) for Variable CASEM Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	3765.50000	4191.0	199.122532	57.0530303
1997-1998	60	4235.50000	3810.0	199.122532	70.5916667
Average Scores Were Used for Ties					
Wilcoxon 2-Sample Test (Normal Approximation) (with Continuity Correction of .5)					
S = 4235.50 Z = 2.13436 Prob > |Z| = 0.0328					
T-Test Approx. Significance = 0.0348					
Kruskal-Wallis Test (Chi-Square Approximation) CHISQ = 4.5662 DF = 1 Prob > CHISQ = 0.0326					

Appendix 3 Table 26: Kruskal-Wallis test for Variable CASEZ.

N P A R 1 W A Y P R O C E D U R E					
Wilcoxon Scores (Rank Sums) for Variable CASEZ Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	3940.50000	4191.0	196.295841	59.7045455
1997-1998	60	4060.50000	3810.0	196.295841	67.6750000
Average Scores Were Used for Ties					
Wilcoxon 2-Sample Test (Normal Approximation) (with Continuity Correction of .5)					
S = 4060.50 Z = 1.27359 Prob > |Z| = 0.2028					
T-Test Approx. Significance = 0.2052					
Kruskal-Wallis Test (Chi-Square Approximation)					
CHISQ = 1.6285 DF = 1 Prob > CHISQ = 0.2019					

Appendix 3 Table 27: Kruskal-Wallis test for Variable GAMBLE.

N P A R 1 W A Y P R O C E D U R E					
Wilcoxon Scores (Rank Sums) for Variable GAMBLE Classified by Variable YEAR					
YEAR	N	Sum of Scores	Expected Under H0	Std Dev Under H0	Mean Score
1995	66	4141.0	4191.0	198.850554	62.7424242
1997-1998	60	3860.0	3810.0	198.850554	64.3333333
Average Scores Were Used for Ties					
Wilcoxon 2-Sample Test (Normal Approximation) (with Continuity Correction of .5)					
S = 3860.00 Z = 0.248931 Prob > |Z| = 0.8034					
T-Test Approx. Significance = 0.8038					
Kruskal-Wallis Test (Chi-Square Approximation)					
CHISQ = 0.06322 DF = 1 Prob > CHISQ = 0.8015					

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Appendix 4

Note that tables are provided for results associated with Hypotheses H_{1A} and H_{3A} , but not for H_{2A} . This is because the null forms of the former two hypotheses were incontrovertibly rejected; but the null form of H_{2A} could not unconditionally be rejected. The most significant findings are the existence of significant between- subjects gender and age effects with respect to both H_{1A} and H_{3A} .

PART A: Summary of Findings from the SAS runs made using Individual Questionnaire items as Categorical Variables with respect to the Testing of H_{1A}

Appendix 4 Table 1: H_{1A} with Respect to Group|Float|Questionnaire_Item

Combined Years: 1995 and 1997/8

Response Variables: Refund Tax Case Y and High Pay Tax Case X

Categorical Variables: Group|Float|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Comboq1.doc	Gender	1. Group 2. Gender	2.53 6.50	0.0226 0.0117	Case	6.93	0.0093
Comboq2.doc	Age	Age	2.30	0.0477	Case*Float	3.26	0.0412
Comboq3.doc	Tax filing in years	Nil			1. Case 2. Case*Float	5.75 4.31	0.0177 0.0151
Comboq4.doc	Private health Ins	Nil			1. Case 2. Case*Float	3.94 2.42	0.0490 0.0922
Comboq5.doc	Fair wrt health sys	Nil			Case	4.84	0.0294
Comboq6.doc	compliance (rich)	Nil			1. Case 2. Case*Float 3. Case*Group*Float	4.50 1.95 3.50	0.0355 0.0764 0.0093
Comboq7.doc	Compliance (poor)	Nil			Case	6.79	0.0101
Comboq8.doc	Tax paying feeling	Group	2.62	0.0192	Case	6.98	0.0091
Comboq9.doc	Freq. Tax due filings	Group	2.02	0.0675	Case	6045	0.0122
Comboq10.doc	Audit perception	Nil			Case	6.36	0.0134
Comboq11.doc	Gambling feelings	Nil			1. Case*Float 2. Case*Float*Q11	6.64 2.32	0.0017 0.0598

Framing Effects and Taxpayer Risks when Filing Tax Returns

Appendix 4 Table 2: H_{1A} with Respect to Group|Float|Questionnaire_Item Continued

Combined Years: 1995 and 1997/8

Response Variables: Refund Tax Case Y and High Pay Tax Case X

Categorical Variables: Group|Float|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Comboq12.doc	Household Income 1	1. Group	2.14	0.0514	1. Case	16.10	0.0001
		2. Float	2.88	0.0593	2. Case*Float	6.64	0.0017
		3. Group*Float*Q12	2.94	0.0351			
Comboq13.doc	Household Income 2	Nil			Case	5.61	0.0192
Comboq14.doc	Job Nature	Nil			Case	5.45	0.0210
Comboq15.doc	Education	Nil			1. Case	4.30	0.0398
					2. Case*Group*Float*Q15	2.19	0.0912
Comboq16.doc	Compliance Awareness	Nil			1. Case	4.41	0.0373
					2. Case*Float	4.73	0.0102
Comboq17.doc	Professional filing	Float	2.42	0.0923	Case	4.69	0.0319
Comboq18.doc	Knowledge of EUT	Nil			Nil		
Comboq19.doc	Knowledge of PT	Nil			Case	4.57	0.0338
Comboq20.doc	Altruism	Group	2.07	0.0587	Case*Float	2.57	0.0796

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Appendix 4 Table 3: H_{1A} with Respect to Group|Order|Questionnaire_Item

Combined Years: 1995 and 1997/8

Response Variables: Refund Tax Case Y and High Pay Tax Case X

Categorical Variables: Group|Order|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Combq1.doc	Gender	Gender	3.29	0.0726	Case	12.98	0.0005
Combq2.doc	Age	Nil			Case	11.05	0.0013
Combq3.doc	Tax filing in years	1. Group*Order 2. Group*Q3	1.52 2.33	0.0885 0.0187	1. Case 2. Case*Group*Order*Q3	15.15 2.47	0.0002 0.0517
Combq4.doc	Private health Ins	Nil			Case	15.17	0.0002
Combq5.doc	Fair wrt health sys	1. Q5 2. Group*Order*Q5	4.50 1.80	0.0028 0.0711	Case	10.37	0.0020
Combq6.doc	Compliance (rich)	Q6	2.34	0.0641	Case	10.32	0.0020
Combq7.doc	Compliance (poor)	Nil			Case	12.86	0.0007
Combq8.doc	Tax paying feeling	Group	3.38	0.0063	Case	12.35	0.0009
Combq9.doc	Freq. Tax due filings	Nil			Case	8.25	0.0059
Combq10.doc	Audit perception	Nil			Case	17.30	0.0003
Combq11.doc	Gambling feelings	Nil			Case	13.69	0.0004
Combq12.doc	Household Income 1	Nil			Case	20.28	0.0001
Combq13.doc	Household Income 2	Nil			Case	18.26	0.0001
Combq14.doc	Job Nature	Nil			1. Case 2. Case*Group*Q14	16.55 1.74	0.0001 0.0720
Combq15	Education	Nil			Case	13.50	0.0005
Combq16	Compliance Awareness	Nil			Case	11.54	0.0011
Combq17	Professional filing	Q17	4.50	0.0055	1. Case 2. Case*Group*Q17	11.67 2.16	0.0010 0.0275
Combq18.doc	Knowledge of EUT	Nil			Case	4.08	0.0456
Combq19.doc	Knowledge of PT	Nil			Case	7.15	0.0085
Combq20	Altruism	Group*Order*Q20	2.36	0.0572	Case	6.80	0.0103

Framing Effects and Taxpayer Risks when Filing Tax Returns

PART B: Summary of Findings from the SAS runs made using Individual Questionnaire Items as Categorical Variables with respect to the Testing of H_{3A}

Appendix 4 Table 4: H_{3A} with Respect to Group|Float|Questionnaire_Item

Combined Years: 1995 and 1997/8

Response Variables: Low Pay Tax Case Z and the Gamble Case

Categorical Variables: Group|Float|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Gambfq1.doc	Gender	Group*Float	2.77	0.0654	Case	42.57	0.0001
Gambfq2.doc	Age	Age	3.70	0.0034	1. Case 2. Case*Float*Age	19.94 1.91	0.0001 0.0709
Gambfq3.doc	Tax filing in years	1. Q3 2. Group*Float*Q3	2.20 2.56	0.0715 0.0572	Case	28.75	0.0001
Gambfq4.doc	Private health Ins	Nil			Case	33.05	0.0001
Gambfq5.doc	Fair wrt health sys	1. Float 2. Q5	3.14 1.99	0.0461 0.0985	1. Case 2. Case*Group*Float	33.31 2.40	0.0001 0.0946
Gambfq6.doc	Compliance (rich)	Q6	2.07	0.0878	Case	28.17	0.0001
Gambfq7.doc	Compliance (poor)	1. Group 2. Float 3. Q7	2.23 2.97 3.01	0.0440 0.0544 0.0202	Case	36.32	0.0001
Gambfq8.doc	Tax paying feeling	1. Group 2. Group*Float 3. Group*Q8	2.48 4.23 1.97	0.0260 0.0164 0.0119	Case	36.30	0.0001
Gambfq9.doc	Freq. Tax due filings	Nil			Case	37.22	0.0001
Gambfq10.doc	Audit perception	Nil			Case	33.86	0.0001
Gambfq11.doc	Gambling feelings	1. Group 2. Q11 3. Group*Q11 4. Float*Q11	2.48 2.81 1.52 2.36	0.0258 0.0276 0.0953 0.0558	1. Case 2. Case*Q11	16.37 2.04	0.0001 0.0920
Gambfq12.doc	Household Income 1	Group*Float	2.56	0.0808	Case	17.79	0.0001
Gambfq13.doc	Household Income 2	Group	1.83	0.0980	Case	29.25	0.0001
Gambfq14.doc	Job Nature	Nil			Case	40.69	0.0001

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Appendix 4 Table 5: H_{3A} with Respect to Group|Float|Questionnaire_Item Continued

Combined Years: 1995 and 1997/8

Response Variables: Low Pay Tax Case Z and the Gamble Case

Categorical Variables: Group|Float|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Gambfq15.doc	Education	Nil			1. Case 2. Case*Group* Float*Q15	38.48 3.88	0.0001 0.0105
Gambfq16.doc	Compliance Awareness	Group*Float*Q16	3.21	0.0751	1. Case 2. Case*Q16	19.44 1.98	0.0001 0.0999
Gambfq17.doc	Professional filing	Nil			1. Case 2. Case*Float	18.81 2.62	0.0001 0.0759
Gambfq18.doc	Knowledge of EUT	Nil			Case	8.06	0.0051
Gambfq19.doc	Knowledge of PT	Nil			Case	12.58	0.0005
Gambfq20.doc	Altruism	Nil			Case	7.96	0.0054

Framing Effects and Taxpayer Risks when Filing Tax Returns

Appendix 4 Table 6

Combined Years: 1995 and 1997/8

Response Variables: Low Pay Tax Case Z and the Gamble Case

Categorical Variables: Group|Order|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Gamboq1.doc	Gender	Gender	14.82	0.0002	1. Case 2. Case*gender	44.94 3.49	0.0001 0.0646
Gamboq2.doc	Age	Age	2.34	0.0488	1. Case 2. Case*Group* Order	28.03 1.73	0.0001 0.0415
Gamboq3.doc	Tax filing in years	Nil			Case	44.79	0.0001
Gamboq4.doc	Private health Ins	Group*Order*Q4	2.59	0.0079	Case	42.36	0.0001
Gamboq5.doc	Fair wrt health sys	1. Q5 2. Group*Q5	2.56 1.74	0.0466 0.0774	Case	33.96	0.001
Gamboq6.doc	Compliance (rich)	Nil			Case	38.42	0.0001
Gamboq7.doc	Compliance (poor)	1. Group 2. Order 3. Q7 4. Group*Q67	2.92 1.61 5.32 2.45	0.0141 0.0827 0.0010 0.0048	Case	42.57	0.0001
Gamboq8.doc	Tax paying feeling	Nil			Case	39.79	0.0001
Gamboq9.doc	Freq. Tax due filings	Nil			Case	29.11	0.0001
Gamboq10.doc	Audit perception	Nil			Case	46.84	0.0001
Gamboq11.doc	Gambling feelings	Q11	2.57	0.0449	1. Case 2. Case*Q11	27.36 2.08	0.0001 0.0927
Gamboq12.doc	Household Income 1	Nil			Case	32.79	0.0001
Gamboq13.doc	Household Income 2	1. Group 2. Q13	1.89 2.29	0.0957 0.0694	Case	38.73	0.0001
Gamboq14.doc	Job Nature	Nil			Case	45.38	0.0001
Gamboq15.doc	Education	Nil			Case	47.20	0.0001
Gamboq16.doc	Compliance Awareness	Nil			1. Case 2. Case*Order*Q16	31.15 1.56	0.0001 0.0789

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Appendix 4 Table 7 Continued

Combined Years: 1995 and 1997/8

Response Variables: Low Pay Tax Case Z and the Gamble Case

Categorical Variables: Group|Order|Questionnaire_Item

Filename	Q'aire Item	Between Subjects Effects	F	Pr > F	Within Subjects Effects	F	Pr > F
Gamboq17.doc	Professional filing	Nil			1. Case 2. Case*Group* Order*Q17	26.18 3.06	0.0001 0.0839
Gamboq18.doc	Knowledge of EUT	Nil			Case	13.26	0.0004
Gamboq19.doc	Knowledge of PT	Nil			Case	15.82	0.0001
Gamboq20.doc	Altruism	Group*Order*Q20	2.97	0.0223	1. Case 2. Case*Order*Q20	13.33 2.29	0.0004 0.0824