Deal or no Deal? That is the Question

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Abstract
In this paper we utilise data from the Australian version of the TV game show, "Deal or No Deal", to explore risk aversion in a high real stakes setting. An attractive feature of this version of the game is that supplementary rounds may occur which switch the decision frame of players. Our key results reveal several main findings. First, we observe that the degree of risk aversion generally increases with stakes. Second, we observe considerable heterogeneity in people's willingness to bear risk – even at very high stakes. Third, we find age and gender being statistically significant determinants of risk aversion, while wealth is not. Fourth, we find that the reversal of framing does have a significant impact on people's willingness to bear risk.

1. Introduction

The analysis of decisions under uncertainty is fundamental to modern economics and finance. This paper contributes to a recently developing empirical literature that adopts the central research question: How risk averse are individuals? Subsidiary questions regarding risk aversion that we address include its heterogeneity and how it varies with individual demographic characteristics (especially age, wealth and gender). While the theoretical literature on risk aversion and expected utility theory is large and long-standing, the literature explicitly testing for risk aversion is comparatively small. Such empirical tests as exist, either in laboratory or field experiments involving real stakes, have mostly been confined to small cash values. There has been a recent debate doubting the applicability of such estimates when extrapolated to high real stakes (see Rabin, 2000 and Segal, 2005). Our paper exploits an Australian game show dataset to explore the nature of risk aversion of contestants who face an environment of very high stakes.

"Deal or No Deal" is a half-hour TV game show in which contestants make a series of choices between a sure thing and a lottery.[1] It is ideal for studying a range of issues relating to economic decision making. The show consists of a chosen contestant faced with 26 suitcases, randomly containing amounts ranging from 50 cents to $200,000 dollars. There are up to nine "normal" rounds in the main stage of the game. Unlike other versions of the show, the Australian version of Deal or No Deal also involves the potential for one of two extra rounds - the Chance round and the SuperCase round.

First, when only two suitcases are left, the contestant may be offered a "Chance" round, allowing them to exchange the certain amount that they've already won for a fifty-fifty lottery between the two remaining prizes. Second, when all suitcases have been revealed, the

[1] We use data from the Australian version of Deal or No Deal, although the show has now been syndicated in over 30 countries. It should be emphasized that the show, although franchised from the same Dutch source (the Endemol TV entertainment company) is not identical across all its franchises. Variations in the game show introduced by different countries leads to different datasets. Confining our attention to a single version of Deal or No Deal has the advantage of giving us a uniform experimental setting.

contestant may be given the option of swapping the certain amount that they have won for the "SuperCase", which is a lottery in which one of eight prizes may be won. Both these possibilities are entirely at the discretion of the producers. These special rounds involve a reversal of the contestants' frame of reference and, hence, are ideal for testing prospect theory. Accordingly, we exploit this feature of our dataset.

Our paper investigates two fundamental issues. First, we explore the willingness of contestants to take risks with large monetary gambles. Second, we assess whether contestants exhibit loss aversion. Regarding the first issue, we find that, while on average most contestants on Deal or No Deal are probably risk averse, their willingness to bear risk is greater than had previously been found in studies of US game shows. Moreover, many contestants are willing to take very risky gambles, even when the stakes are high. There is a high degree of heterogeneity between contestants. Our results also re-affirm the prior literature that people become more risk averse as stakes rise (Holt and Laury, 2002).

The theoretical and scientific attraction of expected utility theory is that it posits a consistent preference relation regardless of changes in the `frame' of the decision, especially with respect to changes in a decision-maker's wealth. Prospect theory (which implies loss aversion[2]) is a well-known example of a theory of decision-making under uncertainty where that is not the case. The Australian version of the Deal or No Deal game show is well-suited to test the second issue (concerning `loss aversion') because some contestants face a reversal of the framing of their choice when they participate in either the Chance round or the SuperCase round described above. In the "normal" rounds, contestants face the prospect of swapping their rights to the lottery for a sure amount of money. In contrast, in the Chance and

[2] `Loss aversion' describes how a person's welfare will fall more as a result of losing a specified amount of money than it rises when they win the same amount of money. People who are loss averse will be willing to take large risks to avoid losses but will tend to be risk averse with potential gains. See, for example, Kahnemann and Tverskey (1979).

SuperCase rounds, contestants face the prospect of exchanging a certain amount of money already won (via the "Deal" agreed to earlier) for a gamble.

Approximately 40 percent of the contestants in our dataset participate in one of these "special" rounds. We find that contestants exhibit a considerably higher level of risk aversion in both the Chance and SuperCase rounds than in the normal rounds. Assuming the validity of an underlying assumption that contestants are characterisable by some type of non-expected utility model, this appears to provide some support for a kind of preference reversal or framing effect. Notably, other game show studies in the literature, as well as versions of the Deal or No Deal game show exhibited in other countries, do not involve such a reversal of the choice framework, and so were not able to test this behavioural effect.

On the important issue of the variation in risk aversion with agent characteristics, we find, consistent with much of the pre-existing literature, that attributes like age and gender have a statistically significant effect. While the evidence to date on this issue is mixed, where studies have found an impact, it is almost always that women are more risk averse than men. Our findings are consistent with Hartog et al (2000) using survey data from the Netherlands, Holt and Laury (2002), using experimental data and Cohen and Einav (2005), who utilize a large car insurance dataset to structurally estimate (and hence control for) risk aversion and attributes long thought to influence risk aversion. A similar gender effect has also been found in numerous studies in the finance literature.

The remainder of this paper is organised as follows. The next section briefly outlines the relevant literature. Section 3 outlines the Deal or No Deal game show and describes the data it generates. Section 4 presents and discusses our empirical results, and Section 5 concludes.

2. Relevant Literature

Researchers have, to date, largely relied upon three methods to study the magnitude and variability (with stakes) of risk aversion. First, they have run experiments in which people face actual monetary gambles.[3] Given the funding limits of such studies, many (though not all) of these studies were perforce small-stakes. The second method is to rely upon responses to surveys (see the discussion at the beginning of Camerer, 1995). This permits the consideration of people's attitudes to gambles involving much larger sums -- but such studies are limited to hypothetical choices and there is no reason for thinking that what people say they will do when faced with high stakes is what they in actual fact will do (see Holt and Laury, 2002 and the discussion in Hartog et. al., 2000). Finally, there is the use of `field experiments,' or situations of data-generation outside the direct control of the researcher in which people are faced with large gambles. This includes a game show literature as well as a small literature utilizing experiments conducted in developing countries. Collectively, these studies have found that people are generally (though only moderately) risk averse in high stakes environments, and that they become more risk averse as the stakes of the gamble increase (though again, only mildly).

Most of the game show papers are limited in their direct comparability to our paper because they involve strategic interaction rather than, as is the case with Deal or No Deal, pure decision theoretic considerations. Papers concerning strategic game shows focus on the disjunction and possible means of reconciliation between actual play and the theoretically prescribed optimal play, an issue since resolved in laboratorial experiments via the use of quantal response equilibrium models (see McKelvey and Palfrey, 1995).[4] A game show

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[3] See for example the survey of the laboratorial auction literature by Bajari and Hortascu (2005), and also Holt and Laury (2002), Harrison et. al. (2003) and Goeree et. al. (2000).

[4] Three papers consider the show `The Price is Right:' Bennett and Hickman (1993), Berk, Hughson and Vandezande (1996) and Healy and Noussair (2004). A paper by Metrick (1995) examines data from the game show `Jeopardy.' None of them explicitly test for risk aversion (as opposed to implying it (or not) via choice of model).

paper that focuses explicitly on measuring risk aversion is Gertner (1993), utilizing data from the show `Card Sharks.' Gertner finds a very high coefficient of risk aversion. Further, Gertner finds that individual player behavior is inconsistent with expected utility theory. Fullenkamp, Tenorio and Battalio (2003) consider lottery games and find risk aversion displayed and also that it varies with the size of the stakes. Hersch and McDougall (1997) consider the same type of data for lottery games and find that income is not a significant determinant, a finding replicated in the current paper. Beetsma and Schotman (2001) consider the show `Lingo' and find evidence of risk aversion.

An advantage of the current paper compared to other game show papers is that Deal or No Deal requires no special skills in order to succeed. This has been recognised as an important characteristic by researchers – so much so, that a rapidly expanding literature using Deal of No Deal data has emerged contemporaneous with our work. Such studies are well represented by: Bombardini and Trebbi (2005); Blavatskyy and Progrebna (2006a & 2006b); Post et al. (2006); and de Roos and Serafidis (2006).

Bombardini and Trebbi (2005), analyse the Italian version of the Deal or No Deal global and structurally estimate a sample average constant risk aversion parameter of about unity. Contrary to our work, they find no evidence for the dependence of risk aversion on agent characteristics like age and gender. In a finding relevant to our paper, they are unable to rule out that their dataset was generated via contestants possessing non-expected utility preferences. Two further papers utilising the Italian version of the show are Blavatskyy and Progrebna (2006a & 2006b). The main focus of the first of these is in confirming that contestant risk aversion is invariant under differing likelihoods of identical gains. In the second paper, the authors exploit a special suitcase-swapping feature of the Italian version of the game show to directly test for (and refute) contestant loss aversion. The paper by Post et al. (2006) uses combined data from the German, Dutch and Belgium franchises and they find that, independent of nationality, player behaviour is both path-dependent and frame-dependent. Like us, de Roos and Serafidis (2006) employ Australian data. They obtain (in a model which ignores the supplementary rounds) a structural estimate of risk aversion of one half (assuming zero initial wealth). They too are unable to rule out the hypothesis that their dataset was generated via contestants possessing non-expected utility preferences.

3. The Game Show

3.1 Description of the Show

The TV game Deal or No Deal is comprised of three stages. The first two involve the selection of a player ("the contestant") chosen to play the game (they reduce the contestant pool from 150 to one), and the third stage deals with the playing of the game proper.

In Stage 1, the 150 members of the studio audience are sorted into 6 groups of 25. One of those groups is chosen at random. An additional, 26th person is chosen at random from the remaining pool of 125. These 26 people progress to Stage 2. Stage 2 is a trivia contest between the 26 people who were selected during Round 1. Participants in Stage 2 answer three simple questions. Of the Stage 2 participants that answer the most questions correctly, the chosen contestant is the person with the fastest reaction time. The contestant then moves on to Stage 3, which is the segment of the game that is of interest for this paper.

Stage 3 constitutes the game proper, and is the part which generates the dataset used in this paper. It starts with 26 numbered suitcases, each of which contains a concealed, pre-determined monetary prize. The 26 unique money prizes range from 50 cents to a maximum of $200,000, with most of the values falling below $10,000. The schedule of prizes is contained in Appendix A. The schedule of prizes remains the same in each show, although the amount allocated to each numbered suitcase is determined randomly before the start of each show.

At the start of Stage 3, the contestant chooses one suitcase, which is set aside. If the contestant plays Stage 3 to its ultimate conclusion, the contestant will win the prize contained in that suitcase. The remaining 25 suitcases are given to the 25 unsuccessful participants in Stage 2 ("the suitcase contestants").

Next, in Round 1 of the game, the contestant chooses six suitcases, from the remaining 25, for removal. As the contestant nominates each suitcase for removal, the monetary prize contained in that suitcase is revealed by the suitcase contestant holding it. Once a money prize has been revealed, it is removed from the game and can no longer be won.[5]

After the first six suitcases have been removed, the "Bank" (ie the producers of the Game show) makes an offer to the contestant via the host of the Game show: the "Bank Offer". The Bank Offer is a cash prize - determined, in part, by which money prizes remain available to be won in the 20 remaining unopened suitcases. The contestant can either accept this offer by choosing "Deal", or continue to the next round of Stage 3 by choosing "No Deal". When making this and all future decisions, the contestant is fully aware of which prizes remain available to be won.[6]

If "Deal" is chosen, the contestant wins the money offered by the Bank but forfeits the right to continue playing Stage 3. If "No Deal" is chosen, then the contestant moves to Round 2 of the game and must nominate a further five suitcases for removal from the 19 unopened cases still held by suitcase contestants. The contestant may not nominate the suitcase originally set aside. After the money prizes contained in these five suitcases are revealed, the

[5] Before each suitcase is opened, the suitcase contestant holding it is given an opportunity to guess the prize within their suitcase. Any suitcase contestant guessing correctly wins $1,000. These events have no impact on our experiment.

[6] One possible issue that could be raised concerning the mechanics of the bank's offer is whether it involves some strategic or informative element, transforming the environment of the field experiment from a pure decision-theoretic to a game theoretic one. We found that the correlation between, on the one hand, the ratio of the bank offer to the expected value of the remaining suitcases, and, on the other, the ratio of the contestant's initially chosen suitcase to the expected value of the remaining suitcases, was 0.08 - a value sufficiently low to suggest that strategic behaviour is a non issue. Moreover, this correlation falls in the final two rounds and even turns slightly negative in round nine. Thus, our operating assumption in this paper that the contestants find themselves in a pure decision-theoretic environment is justified.

contestant receives a second, revised Bank Offer. If, after the second Bank Offer, the contestant chooses "No Deal", a further four suitcases must be removed (Round 3). The Bank then makes a third Bank Offer based on the remaining 11 suitcases.[7]

The contestant again chooses either "Deal" or "No Deal". If "No Deal" is chosen, the contestant moves to a fourth Round and must nominate a further three suitcases for removal. After their removal, the Bank makes a fourth offer, based on the remaining 8 unopened suitcases. The contestant again chooses "Deal" or "No Deal". If "No Deal" is chosen, two more suitcases must be removed in Round 5, after which a fifth Bank Offer is made. If "No Deal" is chosen after the fifth offer, the game enters a phase (Rounds 6-9) in which suitcases held by the suitcase contestants are removed one by one. After the removal of each suitcase, a new Bank Offer is made.

When only one unopened suitcase held by a suitcase contestant remains, the contestant must either accept the 9th Bank Offer or choose their own suitcase over the suitcase held by the single remaining suitcase contestant.

If at any time during the game the contestant has accepted a Bank Offer, s/he will continue to nominate suitcases for removal "as if" s/he were still playing Stage 3. This heightens tension allowing TV viewers to imagine "what might have been." Finally, this counter-factual exercise allows for the possibility (since this occurs at the discretion of the producers) of one of the two supplementary rounds (the Chance and SuperCase rounds) to be played. These rounds, unique to the Australian game show, are important for our test of prospect theory. Appendix B contains a characterization of the rounds of play in the Australian version of Deal or No Deal. Appendix C summarizes the play in 9 normal rounds and a Chance round from an illustrative actual game from our dataset in which the contestant wins $100,000.

[7] That is, the suitcase originally chosen by the contestant and the 10 unopened cases still held by suitcase contestants.

3.2 Description of the Data

We have data for 102 episodes from the second and third series of the Australian version of the Deal or No Deal game show. Table 1 displays descriptive statistics. The mean value of prizes won in these episodes is $15,810 with a standard deviation of $18,541.[8] The minimum prize won was $1 and the maximum $105,000. Not surprisingly, the Bank Offers in the initial rounds were generally low relative to the expected value of the remaining suitcases. Given that there is only one contestant per show, the producers have a strong incentive to ensure that each contestant plays at least a few rounds. In our sample, no contestants accepted an offer in rounds 1, 2 or 3, and only one contestant accepted in the fourth round. A total of 91 contestants played until at least round 6.

However, these averages contain interesting behavioural heterogeneity at the agent level. Perhaps most notably, 49 Bank Offers that were greater than the expected value of the remaining suitcases were rejected. Of these 49 rejected offers, 14 were greater than $8,000, 10 were for greater than $10,000 and 3 exceeded $20,000. The mean Bank Offer greater than expected value that is rejected is $6,000. Out of a sample of 102, 8 different contestants rejected at least one offer greater than an expected value of more than $10,000. As such, this represents a sizeable minority of the sample who exhibit risk-loving behaviour with very large stakes.

We have data on three personal characteristics of each contestant: gender; age; and the postcode in which they reside.[9] Forty eight percent of contestants in the sample were male. The age of contestants varied from 18 to 66 years, with a mean of 32 and standard deviation of 10. For each postcode, we obtained average income data from the 2001 Australian Census, and used this as a proxy for individual wealth.

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[8] For comparative purposes it should be noted that the 26 suitcases that are available to be won at the beginning of each game have a mean of $19,112 and standard deviation of $44,576.

[9] Postcodes in Australia are analogous to Zip Codes in the U.S.

3.3 Strengths and Limitations of the Data

Strengths

Two important advantages of our data are that they describe decisions with both high stakes and real financial consequences. Notably, Holt and Laury (2002) find evidence that people's risk aversion is different when there are real stakes as opposed to hypothetical choices. Further, several studies (Binswanger, 1980, Kachelmeier, 1982 and Holt and Laury, 2002) find that risk aversion increases along with the stakes of a gamble. It is important to stress that the stakes in Deal or No Deal are higher than any feasible experiment and almost any other game shows. The mean prize won by contestants is almost $16,000 with the highest prize being $105,000.[10]

Deal or No Deal also offers contestants very simple, stark choices. Almost all other game shows that have been studied by economists involve some element of skill, whether it be knowledge of trivia, skill in word games or an ability to compute the odds in a game of chance involving cards. The only skill needed in Deal or No Deal is the comparison of a gamble with a certain offer: precisely the computational capacity in which economists are interested when studying decision making under uncertainty.

Finally, the format of the Australian version of Deal or No Deal (or, more precisely, the existence of the Chance and SuperCase rounds), is ideal for testing Prospect Theory as many contestants face a change of framing in the final round of the game. This feature is not present in other Game shows based on lottery choices, and is also not present in other franchises of the Deal or No Deal paradigm shown in other countries.

[10] Put another way, to perform this experiment from scratch would have required a total prize pool of approximately $1.6 million.

Limitations

The possibility of selection bias in the contestant pool is an issue for this paper, as it is for all studies based upon game show data. The process of selecting the contestant in Stages 1 and 2 is likely to mitigate this problem.

As just explained above, there are two stages in the selection of the contestant. First, 26 people are randomly chosen from the audience. It is not clear that the people who volunteer for quiz show audiences are systematically more risk averse or more risk seeking than the broader population. Arguments might plausibly be made that, for example, they may be more extroverted, on average, than the general population, or that they may have more free time on average. But even if these conjectures are true, there can be no a prior supposition that these qualities are correlated with risk aversion, and certainly there is nothing in the existing literature to suggest that they are.

In the second stage, the 26 people randomly chosen from the audience compete to become the contestant by participating in a very simple trivia quiz in which the emphasis is on speed. There is no reason to think that there is any correlation between reaction time in a simple quiz and risk aversion.

The fact that the contestant is, in effect, randomly chosen from the audience via a two-stage process means that it is simply not possible for the producers of the show to engage in as much vetting of contestants as they would if contestants were chosen directly via an application process.

The artificial environment of the Game show could potentially increase or decrease people's risk aversion. On the one hand, the excitement of being on television, surrounded by lights and a screaming audience could make people more prone to risk taking or to errors of judgement. On the other hand, some people may become more risk averse when in front of a national audience and carefully avoid doing anything embarrassingly foolish. The possibility that these factors are roughly in balance, on average, is consistent with earlier studies of game shows which have found that contestants display levels of risk aversion broadly in line with participants in experimental studies.

4. Empirical Findings

4.1 Baseline Analysis ignoring Supplementary Rounds

To explore our main research questions, we conduct probit regression modelling of the likelihood of accepting a bank offer against a number of factors related to the game and observable agent heterogeneity. Factors which raise the likelihood of accepting bank offers can be said to be covariates of risk aversion. Panel A of Table 2 shows both the chosen regressors and the results for the full dataset comprising rounds 1-9 of such a probit regression (where the dependent variable is whether or not a Bank Offer is accepted). It is reported as model (1).

Previous studies have found that risk aversion increases with rising stakes (see Binswanger, 1980; Kachelmeier and Shehata, 1992; and Holt and Laury, 2002). Our results lend support to this. The higher is the Bank Offer relative to the expected value of the remaining suitcases, the more likely a person is to accept. The marginal effect of this ratio is 0.35. We also found a mild scale effect. The higher is the offer, the more likely is a person to accept. The marginal effect of a change in the offer of $10,000 is 0.04. With respect to observable personal characteristics, only age was statistically significant.[11] The model was better at approximating the effects of age when a quadratic, rather than linear, form was used. In unreported results, we also tested a model that included the standard deviation of the

[11] In supplementary analysis, we experimented with all three proxies for income for which we had data: household income, family income and personal income. The results for household income are shown. None of these measures of income was statistically significant.

remaining prizes and various measures of regret.[12] Neither of these variables was statistically significant.[13]

In order to check the robustness of our initial finding with respect to gender, we also included it as an interaction dummy. The results are contained in Panel A of Table 2 as model (2). We interact gender with the offer and with the ratio of the offer to the expected value of the remaining suitcases. Males are more likely to have increasing risk aversion as the stakes of the gamble rise. They are also less likely than females to accept an offer for a given ratio between the offer and the expected value (i.e. to be less risk averse). The current consensus, in what is a still-developing literature, appears to be that when gender has been found to have a significant effect on the measurement of risk aversion (not all studies show an effect), the effect has been that women are more risk averse than men. Our results fit comfortably into this consensus.

Panel B of Table 2 shows the hit-miss table for model (2) - i.e. the likelihood of model (2) correctly predicting the decision for each observation when considering rounds 1-9. Of the 728 offers made, 609 were rejected and 119 accepted. Our model correctly predicts 586 of the rejections (96%) and 49 of the acceptances (41%). This represents a 22% improvement over a baseline model that predicts rejection in all rounds. Notably, an alternative benchmark that separately predicts each round individually does no better than the benchmark used as there is a greater than 50% chance of accepting in only rounds 8 and 9 and it is only slightly higher than 50% in those rounds (51% and 52%, respectively).

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[12] To test regret, we included the ratio of the current Bank Offer to the immediately preceding Bank Offer and, alternatively, the ratio of the current Bank Offer to the highest previous Bank Offer made to the contestant. We also tested the difference between the current Bank Offer and the immediately preceding/highest previous Bank Offer. None of these was statistically significant. Results are not reported to conserve space.

[13] For each of the models tested in the paper, we also estimated results for a panel specification, grouping each agent's sequence of decisions. Depending upon which variables we included and the dataset that we used (i.e. whether we included all rounds or just rounds 6-9), we found that the results either reverted to the non-panel specification or that our estimates of the ratio of the variance of the individual effects to the total variance were not statistically significant.

Rounds 1-5 are relatively uninformative since the Bank Offers are typically set low enough to ensure rejection. Given that there is only one contestant per show, it is necessary for there to be at least 5 rounds to create a meaningful half hour TV program. As a consequence, almost all of the interesting choices occur in rounds 6-9. Accordingly, Table 3 shows the probit results and hit-miss table when the data for estimation is confined to rounds 6-9. Note that focusing solely on later rounds reduces concern about the assumption of myopic decision-making made in this paper.

Focusing on rounds 6-9 reduces the sample size to 233. Both the ratio of the Bank Offer to the expected value of the remaining suitcases and the size of the Bank Offer remain statistically significant in model (1) and the ratio is significant in model (2). Age is only statistically significant at the 10 percent level, which probably reflects the smaller sample size. Gender and income remain statistically insignificant.

The results for model (2) in Panel A of Table 3 include interaction dummies with gender for rounds 6-9. The interaction dummies remain statistically significant (although only at the 10 percent level for the interaction with the ratio) and once again indicate that males are more likely to become risk averse as the stakes increase but that males are also less likely than females to be swayed by a positive bank offer-expected value ratio. The explanatory power of the model increases with the inclusion of the dummy interaction variables with the Pseudo R-squared increasing from 0.137 to 0.156.

As shown in Panel B of Table 3, model (2) now correctly predicts 55% of acceptances, although the prediction rate for rejections falls to 83%. Overall, the model represents a 33% improvement over the baseline case in rounds 6-9.

4.2 Extended Analysis incorporating Supplementary Rounds

Prospect theory asserts that people will display an asymmetry in their attitude to risk delineated by gains versus losses. Specifically, prospect theory posits that people will generally be risk averse in lottery choices involving gains and risk seeking in lottery choices involving losses. In particular, prospect theory suggests a utility function that is (i) defined on deviations from the reference point (not on overall wealth); (ii) is concave for gains and convex for losses; and (iii) is steeper for losses than gains. This results in the well known S-shaped utility function of Kahneman and Tversky (1979) and Tversky and Kahneman (1992).

It was mentioned in the section describing the rules of the game that, even once a contestant has accepted a bank offer, the game does not technically end. Rather, the contestant is required to engage in the counter-factual exercise of continuing to remove suitcases from the remaining suitcases until only two remain, at which time the possibility (since this is entirely at the discretion of the producers) of playing a supplementary Chance or SuperCase round arises.

In the chance situation, the Bank offers the contestant a chance to retract the "Deal" they had accepted in an earlier round. If the contestant accepts the retraction, they swap all winnings from that previously made deal for a lottery. Since the Chance round only ever occurs in Round 9 when just two prize outcomes remain, the Chance round represents a choice between a fifty-fifty gamble between two prizes versus the amount already won in a previous round when the bank offer had been accepted. It is important to note that the Chance round is only ever offered when the two remaining prizes differ by a large magnitude, highlighting the contrast between the risky and the safe options. For example, in one actual game, the contestant faced a choice between a certain offer of $15,100 and a gamble between $10 and $75,000. The person chose the sure amount of money. Accepting the "Chance" offer is not compulsory. In our sample, the Chance option was offered 20 times, with the mean value of the two cases being $18,229 compared to the considerably lower mean value of already accepted deal of $9,824. Notwithstanding this, in only 7 Chance rounds was the suitcase gamble accepted, suggestive of loss aversion at work.

The SuperCase round is played after all suitcases have been opened. If the contestant elects to take the SuperCase option, they will win whatever cash amount is revealed to be inside the SuperCase, and forfeit their previously struck deal. In each game where it is offered, one of the following cash values will be selected at random, and placed inside the SuperCase: $0.50; $100; $1,000; $2,000; $5,000; $10,000; $20,000; or $30,000. The mean and standard deviation of the SuperCase option are $8,510 and $11,000 respectively. In our sample, the SuperCase was offered 24 times, with the contestants having previously accepted deals ranging from $2,100 to $17,800. The mean of previously accepted deals was $8,750. For example, in one game, the contestant had previously accepted a Deal of $6,350. After all suitcases had been revealed, the contestant was offered the SuperCase option. The contestant accepted, and won $20,000. In only eight SuperCase rounds was the SuperCase chosen.

It can be seen from this description of the two supplementary rounds that they involve a change in the framing of the choice faced by the contestant. On the one hand, in rounds 1-9, the contestant chooses whether or not to swap his/her right to a lottery for a sure amount of money. The choices involve only possible gains, no possible losses. The contestant "owns" the right to keep removing suitcases until only the suitcase initially nominated remains and to receive Bank Offers after each round of this process. Each time a Bank Offer is made, the contestant is being asked to sell this lottery. On the other hand, in the Chance and SuperCase rounds, the choice is reversed, and the possibility of making a loss is introduced. Specifically, the contestant has already accepted a Deal and is being asked to swap his/her sure winnings for a gamble. In other words, the contestant is now being asked to buy a new lottery. If the contestant's current winnings become the reference point (as suggested by prospect theory), then accepting either the Chance or SuperCase deals will mean accepting a positive probability of suffering a loss relative to the reference point and a positive probability of enjoying a gain relative to the reference point. Specifically, consider the Chance round in which a person will face a choice between the 2 remaining suitcases or a sure amount of money. Thus in the Chance round, the contestant chooses between a 50-50 chance of losing or gaining relative to the reference position or status quo. A person with an S-shaped utility function which is steeper for losses than gains will be less likely to accept a Chance (or SuperCase) round gamble.

To explore the issue of loss aversion, we again re-estimate the probit regression but this time include the impact of the Chance and SuperCase rounds on the willingness of a contestant to accept an offer. While the offer is usually the Bank Offer, in the Chance and SuperCase rounds, the offer represents the status quo. The results of this new probit regression are shown in Table 4.

Panel A of Table 4 contains the results of a Probit for rounds 1-9 that includes dummies for whether the decision is made during a Chance or SuperCase round. A further variable, "high cases remaining" is also included. The highcase variable is the proportion of remaining suitcases that are higher than that round's Bank Offer. We include it to capture the possible heuristic behaviour by contestants – that the contestant takes account of how many remaining suitcases are above the Bank Offer for that round.

The Chance and SuperCase dummy variables and the highcase variable are all statistically significant at the one percent level. Further, the Chance and SuperCase dummies have a high marginal effect. Males are less likely to accept the Bank Offer in the Chance and SuperCase rounds (i.e. they are more likely to take the gamble by giving up their already won prize) and are also less likely to be affected by the high case rule of thumb.

The statistical significance and high marginal effect of the dummies for the Chance and SuperCase rounds in these probit regressions is suggestive of a reference point switching explanation for any greater reluctance to accept risk in the Chance or SuperCase rounds compared to the scenario faced in earlier rounds. Given our earlier observations, any extra reluctance to take on risk in these supplemental rounds is unlikely to be due to any concavity in contestants' utility functions, since we saw a relatively high incidence of risk loving behaviour.

Panel B of Table 4 repeats the earlier exercise of comparing the predictive power of the model against the benchmark. The model performs considerably better than the model in the previous section, correctly predicting 50% of acceptances and representing an overall 31% improvement on the benchmark model.

Table 5 tests the same model as outlined in Table 4, but using data only from rounds 6-9. As discussed, almost all of the difficult choices faced by contestants are in rounds 6-9. Once again, most variables are statistically significant at the one percent level and the Chance and SuperCase dummies have a high marginal effect. Once more, the highcase variable is statistically significant and, as expected, its marginal effect is much higher for these later rounds than it was for the entire sample. Despite a small loss of accuracy on the rejections, we see a 44% overall improvement on the benchmark.

5. Conclusion

Herein we analyse a simple lottery-choice setting within the Australian version of the TV game show, "Deal or No Deal", that allows us to explore a range of issues related to risk aversion in the context of both very high and wide-ranging (possible) payoffs. Notably, a feature of the game is especially convenient for testing non-expected utility theories relating to loss aversion and the effects of changes in reference points.

The main findings of our analysis are easily summarized. First, we generally observe that as the stakes of this lottery game increase, so to does the degree of risk aversion (similar to Holt and Laury, 2002). Having said that however, we observe considerable heterogeneity in people's willingness to bear risk – indeed, a sizeable proportion of contestants in our sample appear to be risk-loving. Moreover, such risk loving behaviour is sometimes evident with decisions involving very high stakes. We also find heterogeneity with respect to observable agent characteristics, with age and gender being statistically significant determinants of risk aversion, while wealth is not.

Second, we are able to exploit a special feature of the game show that sometimes appears at the final decision-stage and which reverses the choice faced by contestants up till that time. Specifically, instead of being offered a sure-thing in exchange for a lottery, contestants who are entitled to end the show with money already secured, are offered a lottery in exchange for that sure-thing. In this context, we find that the reversal of framing has a significant impact on people's willingness to bear risk, and that their high level of risk aversion during the Chance and SuperCase rounds is consistent with Prospect Theory.

Table 1: Basic Descriptive Statistics

This table reports basic descriptive statistics for the full sample of rounds for the Australian version of the TV game show “Deal or No Deal”. The statistics shown are number of observations; mean; standard deviation; minimum value and maximum value. The variables are: Prize won; OFFER: the value of the bank offer; MALE: a dummy variable that takes the value of unity if the contestant is a male; AGE: the contestant’s age measured in years; INCOME: is individual income proxied by the average weekly income associated with the postcode (analogous to zip code) of the contestant based on data from the 2001 Australian Census; HINCOME: is household income proxied by the average weekly household income associated with the postcode of the contestant based on data from the 2001 Australian Census; FINCOME: is family income proxied by the average weekly family income associated with the postcode of the contestant based on data from the 2001 Australian Census.

	Obs	Mean	Stand Dev	Minimum	Maximum
Prize Won	102	$15, 810	$18, 541	$1	$105, 000
OFFER	741	$8, 717	$9, 783	$1	$105, 000
MALE	728	0.48	0.49	0	1
AGE	728	32 years	9.7 years	18 years	66 years
INCOME	720	$421	$86	$250	$650
HINCOME	720	$920	$200	$450	$1, 750
FINCOME	720	$1, 089	$256	$550	$1, 750

Table 2: Probit Model of Accepting the Bank Offer in the TV Game show "Deal or No Deal" – All Nine Rounds

This table reports the results of two probit regression models of the probability of accepting the bank offer in a given round of the Australian version of the TV game show Deal or No Deal. The data used in this analysis are for the complete set of nine normal rounds of the game. Panel A shows the probit regressions results for model (1) – no interaction terms and model (2) – including interaction terms. The dependent variable (DV) takes a value of unity if the bank offer is accepted by the contestant and zero otherwise. The independent variables are defined as follows: OFFER is the value of the bank offer measured in \$10,000 units; RATIO is the ratio of the bank offer to the expected value of the gamble; MALE is a dummy variable that takes the value of unity if the contestant is a male; AGE is the contestant's age measured in years; AGE^2 is the square of the contestant's age measured in $years^2$; HINCOME is proxied by the average income associated with the postcode (analogous to zip code) of the contestant based on data from the 2001 Australian Census. Immediately below each estimated coefficient in parentheses are the associated z-statistics. The reported coefficient on AGE^2 is scaled by 10^3 to enhance readability. Statistical significance at the 1% and 5% levels is indicated by ** and *, respectively. Panel B shows hit-miss tables associated with Model (2) estimates reported in Panel A. These contingency tables show a 2x2 scheme of correct and incorrect classifications. In the left hand side of the panel ('estimated equation') the predicted probability of each observation is determined relative to a 0.5 probability cutoff value. In this case a correct classification occurs when the predicted probability ≤ 0.5 (> 0.5) coincides with an actual value for the dependent variable equal to 0 (1). In the right hand side of the panel ('constant probability') a naïve prediction is made that all observations are equal to the most common case i.e. the offer is not accepted (DV = 0). In this case all DV = 0 (DV = 1) observations are correctly (incorrectly) classified. The 'predictive ability' of the model is gauged by a measure of the gain achieved from applying the probit specification relative to the naïve case, and is recorded as the Total Gain: in percentage points and Percent Gain: as a percentage of the incorrect classifications in the constant probability model.

Panel A: Regression Estimates

	Model (1)		Model (2)	
	Coefficient (z-stat)	Marginal Effect	Coefficient (z-stat)	Marginal Effect
Constant	-1.24	-	-1.74*	-
	(-1.66)		(-2.56)	
OFFER	0.294**	0.04	0.223**	0.03
	(4.74)		(3.31)	
RATIO	2.40**	0.35	2.57**	0.37
	(11.76)		(10.94)	
MALE	-0.01	-0.001	-	-
	(0.04)			
AGE	-0.08*	-0.01	-0.07	-0.01
	(-2.23)		(-1.79)	
AGE^2	0.83	-0.12	0.63	-0.09
	(1.65)		(1.23)	
HINCOME	-0.15	-0.02	-	-
	(-0.43)			
MALE*OFFER	-	-	0.37**	0.05
			(2.79)	
MALE*RATIO	-	-	-0.29	-0.04
			(-1.46)	
Number of Obs	720		728	
Pseudo R^2	0.371		0.381	

Panel B: Hit-Miss Tables for Model (2)

	Estimated Equation			Constant Probability		
	DV = 0	DV = 1	Total	DV = 0	DV = 1	Total
P(DV=1) ≤0.5	586	70	656	609	119	728
P(DV=1) >0.5	23	49	72	0	0	0
Total	609	119	728	609	119	728
Correct	586	49	635	609	0	609
%Correct	96.22	41.18	87.22	100.00	0.00	83.61
%Incorrect	3.78	58.82	12.78	0.00	100.00	16.39
Total Gain	-3.78	41.18	3.61	-	-	-
%Gain	-	41.18	22.03	-	-	-

Table 3: Probit Model of Accepting the Bank Offer in the TV Game show "Deal or No Deal" – Rounds 6 to 9

This table reports the results of two probit regression models of the probability of accepting the bank offer in a given round of the Australian version of the TV game show Deal or No Deal. The data used in this analysis are for rounds six to nine only. Panel A shows the probit regressions results for model (1) – no interaction terms and model (2) – including interaction terms. The dependent variable (DV) takes a value of unity if the bank offer is accepted by the contestant and zero otherwise. The independent variables are defined as follows: OFFER is the value of the bank offer measured in $10,000 units; RATIO is the ratio of the bank offer to the expected value of the gamble; MALE is a dummy variable that takes the value of unity if the contestant is a male; AGE is the contestant's age measured in years; AGE^2 is the square of the contestant's age measured in $years^2$; INCOME is proxied by the average income associated with the postcode (analogous to zip code) of the contestant based on data from the 2001 Australian Census. Immediately below each estimated coefficient in parentheses are the associated z-statistics. The reported coefficient on AGE^2 is scaled by 10^3 to enhance readability. Statistical significance at the 1% and 5% levels is indicated by ** and *, respectively. Panel B shows hit-miss tables associated with Model (2) estimates reported in Panel A. These contingency tables show a 2x2 scheme of correct and incorrect classifications. In the left hand side of the panel ('estimated equation') the predicted probability of each observation is determined relative to a 0.5 probability cutoff value. In this case a correct classification occurs when the predicted probability ≤ 0.5 (> 0.5) coincides with an actual value for the dependent variable equal to 0 (1). In the right hand side of the panel ('constant probability') a naïve prediction is made that all observations are equal to the most common case i.e. the offer is not accepted (DV = 0). In this case all DV = 0 (DV = 1) observations are correctly (incorrectly) classified. The 'predictive ability' of the model is gauged by a measure of the gain achieved from applying the probit specification relative to the naïve case, and is recorded as the Total Gain: in percentage points and Percent Gain: as a percentage of the incorrect classifications in the constant probability model.

Panel A: Regression Estimates

	Model (1)		Model (2)	
	Coefficient (z-stat)	Marginal Effect	Coefficient (z-stat)	Marginal Effect
Constant	0.70	-	-0.17	-
	(0.65)		(-0.17)	
OFFER	0.16^{*}	0.06	0.11	0.04
	(2.40)		(1.55)	
RATIO	1.41^{**}	0.10	1.61^{**}	0.63
	(5.49)		(5.57)	
MALE	-0.12	-0.05	-	-
	(-0.66)			
AGE	-0.10	-0.04	-0.09	-0.03
	(-1.98)		(-1.64)	
AGE^2	1.16	0.45	0.94	0.37
	(1.65)		(1.34)	
HINCOME	-0.42	-0.17	-	-
	(-0.92)			
MALE*OFFER	-	-	0.52^{**}	0.21
			(2.73)	
MALE*RATIO	-	-	-0.39	-0.15
			(-1.84)	
Number of Obs	230		233	
Pseudo R^2	0.137		0.156	

Panel B: Hit-Miss Table for Model (2)

	Estimated Equation			Constant Probability		
	DV = 0	DV = 1	Total	DV = 0	DV = 1	Total
P(DV=1) ≤0.5	109	45	154	132	101	233
P(DV=1) >0.5	23	56	79	0	0	0
Total	132	101	233	132	101	233
Correct	109	56	165	132	0	132
%Correct	82.58	55.45	70.82	100.00	0.00	56.67
%Incorrect	17.42	44.55	29.18	0.00	100.00	43.33
Total Gain	-17.42	55.45	14.15	-	-	-
%Gain	-	55.45	32.66	-	-	-

Table 4: Probit Model of Accepting the Bank Offer in the TV Game show "Deal or No Deal" Incorporating the Chance and SuperCase Rounds – All Nine Rounds

This table reports the results of a probit regression model of the probability of accepting the bank offer in a given round of the Australian version of the TV game show Deal or No Deal. The data used in this analysis incorporates all nine normal rounds of the game, as well as the supplementary 'Chance' and 'SuperCase' rounds. Panel A shows the probit regressions results. The dependent variable (DV) takes a value of unity if the bank offer is accepted by the contestant (or, in the case of the Chance and SuperCase rounds, the contestant opts for the previously accepted Bank Offer) and zero otherwise. The independent variables are defined as follows: OFFER is the value of the bank offer measured in $10,000 units; RATIO is the ratio of the bank offer to the expected value of the gamble; CHANCE is a dummy variable that takes the value of unity if the round is a chance round; SUPERCASE is a dummy variable that takes the value of unity if the round is a SuperCase round; HIGHCASE is the proportion of remaining suitcases that are higher than that of the bank's current offer; AGE is the contestant's age measured in years; AGE^2 is the square of the contestant's age measured in $years^2$; MALE is a dummy variable that takes the value of unity if the contestant is a male. Immediately below each estimated coefficient in parentheses are the associated z-statistics. The reported coefficient on AGE^2 is scaled by 10^3 to enhance readability. Statistical significance at the 1% and 5% levels is indicated by ** and *, respectively. Panel B shows hit-miss tables associated with the model estimates reported in Panel A. These contingency tables show a 2x2 scheme of correct and incorrect classifications. In the left hand side of the panel ('estimated equation') the predicted probability of each observation is determined relative to a 0.5 probability cutoff value. In this case a correct classification occurs when the predicted probability ≤ 0.5 (> 0.5) coincides with an actual value for the dependent variable equal to 0 (1). In the right hand side of the panel ('constant probability') a naïve prediction is made that all observations are equal to the most common case i.e. the offer is not accepted (DV = 0). In this case all DV = 0 (DV = 1) observations are correctly (incorrectly) classified. The 'predictive ability' of the model is gauged by a measure of the gain achieved from applying the probit specification relative to the naïve case, and is recorded as the Total Gain: in percentage points and Percent Gain: as a percentage of the incorrect classifications in the constant probability model.

Panel A: Regression Estimates

	Coefficient (z-stat)	Marginal Effect
Constant	-1.69*	-
	(-2.16)	
OFFER	0.375**	0.04
	(4.42)	
RATIO	3.13**	0.31
	(9.91)	
CHANCE	2.77**	0.81
	(5.37)	
SUPERCASE	4.07**	0.95
	(4.19)	
HIGHCASE	-2.56**	-0.25
	(-2.86)	
AGE	-0.08	-0.01
	(-1.78)	
AGE^2	0.70	0.07
	(1.20)	
MALE*OFFER	0.274	0.03
	(1.81)	
MALE*RATIO	-0.65*	-0.06
	(-2.04)	
MALE*CHANCE	-1.63*	-0.05
	(-2.41)	
MALE*SUPERCASE	-1.97	-0.05
	(-1.65)	
MALE*HIGHCASE	1.77	0.18
	(1.76)	
Number of Obs	728	
Pseudo R^2	0.485	

Panel B: Hit-Miss Table

	Estimated Equation			Constant Probability		
	DV = 0	DV = 1	Total	DV = 0	DV = 1	Total
P(DV=1) ≤0.5	586	59	645	609	119	728
P(DV=1) >0.5	23	60	83	0	0	0
Total	609	119	728	609	118	728
Correct	586	60	646	609	0	609
%Correct	96.22	50.42	88.74	100.00	0.00	83.61
%Incorrect	3.78	49.58	11.26	0.00	100.00	16.39
Total Gain	-3.78	50.42	5.13	-	-	-
%Gain	-	50.42	31.30	-	-	-

Table 5: Probit Model of Accepting the Bank Offer in the TV Game show "Deal or No Deal" Incorporating the Chance and SuperCase Rounds – Rounds 6 to 9

This table reports the results of a probit regression model of the probability of accepting the bank offer in a given round of the Australian version of the TV game show Deal or No Deal. The data used in this analysis incorporates data for rounds six to nine, as well as the supplementary 'Chance' and 'SuperCase' rounds. Panel A shows the probit regressions results. The dependent variable (DV) takes a value of unity if the bank offer is accepted by the contestant (or, in the case of the Chance and SuperCase rounds, the contestant opts for the previously accepted Bank Offer) and zero otherwise. The independent variables are defined as follows: OFFER is the value of the bank offer measured in \$10,000 units; RATIO is the ratio of the bank offer to the expected value of the gamble; CHANCE is a dummy variable that takes the value of unity if the round is a chance round; SUPERCASE is a dummy variable that takes the value of unity if the round is a SuperCase round; HIGHCASE is the proportion of remaining suitcases that are higher than that of the bank's current offer; AGE is the contestant's age measured in years; AGE^2 is the square of the contestant's age measured in $years^2$; MALE is a dummy variable that takes the value of unity if the contestant is a male. Immediately below each estimated coefficient in parentheses are the associated z-statistics. The reported coefficient on AGE^2 is scaled by 10^3 to enhance readability. Statistical significance at the 1% and 5% levels is indicated by ** and *, respectively. Panel B shows hit-miss tables associated with the model estimates reported in Panel A. These contingency tables show a 2x2 scheme of correct and incorrect classifications. In the left hand side of the panel ('estimated equation') the predicted probability of each observation is determined relative to a 0.5 probability cutoff value. In this case a correct classification occurs when the predicted probability ≤ 0.5 (> 0.5) coincides with an actual value for the dependent variable equal to 0 (1). In the right hand side of the panel ('constant probability') a naïve prediction is made that all observations are equal to the most common case i.e. the offer is not accepted (DV = 0). In this case all DV = 0 (DV = 1) observations are correctly (incorrectly) classified. The 'predictive ability' of the model is gauged by a measure of the gain achieved from applying the probit specification relative to the naïve case, and is recorded as the Total Gain: in percentage points and Percent Gain: as a percentage of the incorrect classifications in the constant probability model.

Panel A: Regression Estimates

	Coefficient (z-stat)	Marginal Effect
Constant	-0.80	-
	(-0.76)	
OFFER	0.247^{**}	0.01
	(2.85)	
RATIO	2.32^{**}	0.92
	(6.08)	
CHANCE	2.17^{**}	0.60
	(4.17)	
SUPERCASE	3.01^{**}	0.66
	(3.02)	
HIGHCASE	-2.06^{*}	-0.81
	(-2.12)	
AGE	-0.08	-0.03
	(-1.34)	
AGE^2	0.78	0.31
	(1.02)	
MALE*OFFER	0.419^{*}	0.17
	(2.04)	
MALE*RATIO	-0.69^{*}	-0.27
	(-2.01)	
MALE*CHANCE	-1.59^{*}	-0.42
	(-2.36)	
MALE*SUPERCASE	-1.78	-0.44
	(-1.44)	
MALE*HIGHCASE	1.64	0.64
	(1.50)	
Number of Obs	233	
Pseudo R^2	0.256	

Panel B: Hit-Miss Table

	Estimated Equation			Constant Probability		
	DV = 0	DV = 1	Total	DV = 0	DV = 1	Total
P(DV=1) ≤0.5	111	21	132	132	101	233
P(DV=1) >0.5	36	65	101	0	0	0
Total	147	86	233	132	101	233
Correct	111	65	176	132	0	132
%Correct	75.51	75.58	75.54	100.00	0.00	56.67
%Incorrect	24.49	24.42	24.46	0.00	100.00	43.33
Total Gain	-24.49	75.58	18.87	-	-	-
%Gain	-	75.58	43.55	-	-	-

Appendix A: Schedule of Prizes in Deal or No Deal TV Game show

$0.50	$1,000
$1	$1,500
$2	$2,000
$5	$3,000
$10	$5,000
$25	$7,500
$50	$10,000
$75	$15,000
$100	$25,000*
$150	$50,000
$250	$75,000
$500	$100,000
$750	$200,000

* In 41 of the 102 episodes of the game show for which we have data, a new car was substituted as the prize in place of the $25,000 amount. The car was worth approximately $25,000 and, therefore, for convenience, we used the monetary value of $25,000 for that suitcase in all instances.

Appendix B: Characterization of the Rounds of Play in the Deal or No Deal TV Game show

Round #	# of Beginning Cases	# of Cases Removed	# of Ending Cases	Bank Offer	Decision	Outcome
1	26	6	20	$BO1	Reject	Play next round
					Accept	Take $BO1 (denote as $WIN)[1]
2	20	5	15	$BO2	Reject	Play next round
					Accept	Take $BO2 ($WIN)[1]
3	15	4	11	$BO3	Reject	Play next round
					Accept	Take $BO3 ($WIN)[1]
4	11	3	8	$BO4	Reject	Play next round
					Accept	Take $BO4 ($WIN)[1]
5	8	2	6	$BO5	Reject	Play next round
					Accept	Take $BO5 ($WIN)[1]
6	6	1	5	$BO6	Reject	Play next round
					Accept	Take $BO6 ($WIN)[1]
7	5	1	4	$BO7	Reject	Play next round
					Accept	Take $BO7 ($WIN)[1]
8	4	1	3	$BO8	Reject	Play next round
					Accept	Take $BO8 ($WIN)[1]
9	3	1	2	$BO9	Reject	Win $prize in own case ($WIN)[1]
					Accept	Take $BO9 ($WIN)[1]
Chance[2]	-	-	-	Lottery: Case A or Case B	Reject	Retain $WIN
					Accept	Win $A or $B
SuperCase[3]	-	-	-	Lottery: SC1 or SC2 or SC3 or SC4 or …SC8	Reject	Retain $WIN
					Accept	Win $0.50 or $100 or $1,000 or …. $30,000

[1] This may not be the final outcome of the game – the contestant may be invited to partake in the Chance or SuperCase round, after Round #9.

[2] In the Chance round the bank offers the (uncertain) lottery choice involving the two cases remaining in Round #9: Case A or Case B.

[3] In the SuperCase round the bank offers the (uncertain) lottery choice involving eight different super case values – denoted SC1, SC2, …, SC8. The possible values contained in the super case are: $0.50; $100; $1,000; $2,000; $5,000; $10,000; $20,000 and $30,000.

Appendix C: Illustration of the Rounds of Play in an Actual Episode of the Deal or No Deal TV Game show

Round #	# of Beg Cases	Cases Removed	# of End Cases	Bank Offer	Decision	Outcome
1	26	6 cases: $75,000; $750; $50; $25; $25,000; $50,000	20	$9,100	Reject	Play next round
2	20	5 cases: $200,000; $0.50; $2; $3,000; $100	15	$3,800	Reject	Play next round
3	15	4 cases: $500; $5; $1,000; $10	11	$6,910	Reject	Play next round
4	11	3 cases: $2,000; $1; $250	8	$8,450	Reject	Play next round
5	8	2 cases: $7,500; $15,000	6	$7,400	Reject	Play next round
6	6	$10,000	5	$9,900	Reject	Play next round
7	5	$75	4	$12,250	Reject	Play next round
8	4	$150	3	$17,700	Accept	Take $11,400
9	3	$1,500	2	NA	NA	NA
Chance	-	-	-	Lottery: $5,000 or $100,000	Accept	Win $100,000

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