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S1_3 Deal or No Deal?

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Abstract

A brief study of the bankers' actions on the popular TV show 'Deal or No Deal' using real data to prove or disprove the hypothesis that the banker is predictable.

Introduction

Since first being broadcast several years ago, the television program, 'Deal or No Deal' [1] has proved to be very popular. In the game, there are 22 boxes that randomly contain various amounts of money from 1p to £250000 averaging £25,712, the contestant picks one box to be their own box and then eliminates the other boxes and in the process reveals their values over several rounds. After each round the 'banker' offers the player a sum of money for their box, at which point the player answers the question, 'deal or no deal?' The game ends when the contestant either accepts the bankers' offer or the player eliminates all the boxes and takes the money within their own box. In each game the banker will make 6 offers per game, even if the player has dealt as it shows what he would have offered had the player carried on.

This article looks at the offers the banker makes. To do this we'll set up a hypothesis and then analyse data from several episodes to either verify or reject it.

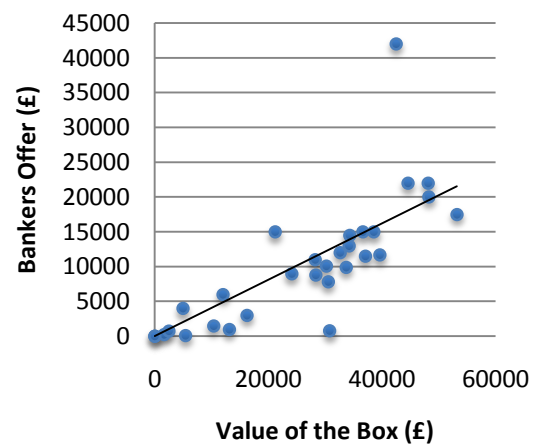
The Hypothesis

'The banker's offers are predictable'

Analysis

Over the course of the week beginning 12th October 2009, we recorded information from the show each day, 5 shows in total and therefore 30 offers in total. We noted which sums of money that were eliminated and the bankers offer each time. From this we calculated the value of the box (the arithmetic mean of all the sums of money remaining) and plotted it against the bankers' offers in order to find a relationship. The graph is as follows;

Fig.1

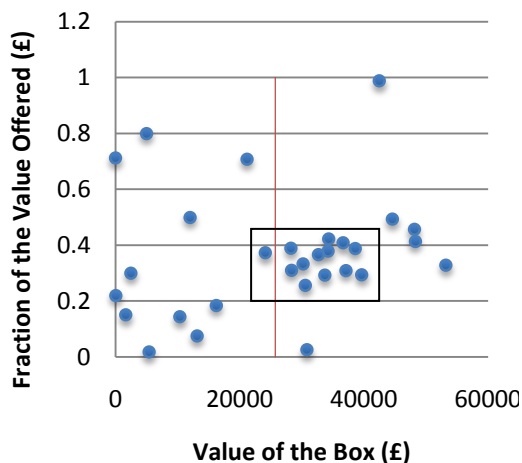


As can be seen above, there is a good correlation between the offer and the value as would be expected, with a Pearson correlation coefficient of 0.78 (-1 being perfect negative correlation and 1 being perfect positive), this is calculated quickly using excel. The line of best fit has the equation;

$$y=0.4046x \quad (1)$$

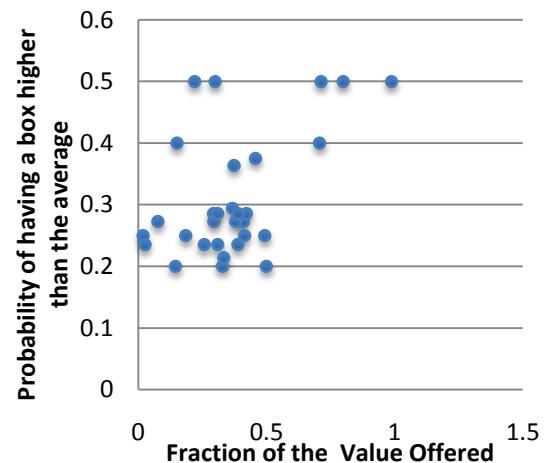
However there is a high degree of variation with these values and several anomalous results. To try and understand the banker further we'll plot the fraction of the value offered (Bankers offer divided by the value of the box) against the value;

Fig.2



For this set of data, the correlation coefficient is only 0.17. As can be seen there is a slight correlation at around (30,000, 0.4) which is highlighted by the box. This makes sense as this is the same region as initial average value of the box (indicated by the red line) and thus represents a stable position, anything outside of the boxed area shows very little correlation and represents a game that is either in the bankers' favour (lower than the average) or the contestants favour (higher than the average). In another attempt to predict the banker, the probability of having a box that is higher than the average was plotted against the fraction of the value offered;

Fig.3



As can be seen there is an increase in correlation here, with a coefficient of 0.52 and a small density at the 0.4 fraction of the value.

Conclusion

The analysis shows that the general pattern of the bankers offers generally increase with the value of the box however they are always much lower than this value as the banker tries to make a profit. This is described by equation (1) with a correlation coefficient of 0.78. He is particularly predictable in a stable game situation, one in which the average value is similar to the initial average, as all analysis shows an increased correlation in this area. However when the game shifts in his or the players favour, his actions become unpredictable and the formula for the bankers offer becomes less reliable. From this information the hypothesis is only partially true, the banker is only predictable within a stable game environment and outside of this he is highly unpredictable. His unpredictability could be down to the contestants and bankers personalities, for instance an aggressive player may force the banker to offer larger amounts where as a conservative player would take less, this could also explain several anomalous results. Further research could involve classifying the type of player and the banker's response to this.

References

- [1] Deal or No Deal, Endemol UK