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Morone, Andrea and Santorsola, Marco and Tiranzoni, Paola

University of Bari, University of Bari, University of Bari

10 November 2021

DEAL OR NO DEAL: COMPARING INDIVIDUAL, GROUP AND COUPLE CHOICES IN A RISKY CONTEXT

EVIDENCE FROM THE ITALIAN TV SHOW EDITION

Andrea Morone [a], Marco Santorsola [a*], Paola Tiranzoni [a]

[a] Bari University "Aldo Moro", Department of Economics, Management and Business Law, Largo Abbazia Santa Scolastica 53, Bari, Italy, 70124

*corresponding author: marco.santorsola@uniba.it

Abstract: This work building on well-established economics literature on TV game shows aims, in an innovative manner, to provide further noteworthy insights. We compare individual, group and couple choices in the risky choice context provided by the Italian version of the international TV show "Deal or no Deal". After analyzing contestant's behaviour during the standard edition episodes plus two special editions we calculate a risk index showing that couples (affianced couples) display a greater degree of risk aversion while no statically significant difference is present between individuals' and groups' actions. This paper could be a starting point for future research investigating the rationale behind such conduct to examine whether such pattern would also be observed in a context different from that of TV game shows (e.g. financial decisions).

Keywords: Deal or no Deal, risky context, risk aversion, group and individual risk preferences, TV game shows

1. Introduction and literature review

During the past 20 years extensive research has been done on the behavior displayed by TV game shows contestants. This derives from the fact that risky choice experiments involving real monetary payoffs and incentives although increasingly popular are somehow limited to small payment amounts or reduced subject pool due to budget scarcity. Searching for a solution to this issue is not an easy task, in fact in most cases researchers are not able to directly infer risk preferences from most real-life situations.

TV game shows even though generally designed by entertainment professionals to amuse the general public and not by scholars, provide a very good opportunity for natural experiment economic analysis. As for their design, they usually provide a simplified and controlled decision-making framework for participants with very large monetary amounts at stake (i.e. potential wins).

Some remarkable examples of research on TV games show include but not limited to "Card Sharks" (Robert H. Gertner, 1993), Jeopardy! (Metrick, 1995), Hoosier Millionarie (Fullenkamp et al., 2003).

Gartner estimated the coefficient of absolute risk aversion for the contestants and found evidence that they segregate risky decisions and do not extrapolate previous luck in future decisions.

Metrick's results indicate near risk-neutrality and that, while most players behave rationally, the failure percentage for choosing best-responses grows as the betting problem becomes more complex and that players' choices are influenced by the "framing" of the problem. Anyhow, suboptimal betting decreases as inferior contestants are driven out of the game.

Fullenkamp et al. (2003) estimated coefficients of risk aversion implying pronounced risk aversion for the high-stakes lotteries in Hoosier Millionaire (the final lotteries have usually much larger stakes when compared to other 1990 and early 2000s TV shows) and near risk neutrality for small-stakes lotteries.

The 3 TV game shows are very different, indeed in the Hoosier Millionaire there is little skill involved, the potential winnings are large and contestants tend to be more representative of the general population while in Card Sharks the stakes are lower and the game rounds involve non-immediate probability calculation. In Jeopardy! individual skill is crucial and contestants are less descriptive of the general population.

Other notable examples are Friedman (1998) and Morone et al. (2021) where they analysed the famous Monty Hall's 3 door game (3 doors; 2 have a goat behind and 1 has a prize) showing that the best strategy is to always switch the initially chosen door after the first goat has been revealed. While Friedman replicated the game in the laboratory with students under different treatments to check for switching rates, Morone et al. did so in an artefactual field experiment with subjects being shoppers in a mall (in Bari, Italy).

2. The TV show description

The focus of our study is the Italian edition of "Deal or no Deal", known as "Affari Tuoi".

The game sees 20 players, one from each of the 20 Italian regions. They are randomly assigned a sealed box, each containing a prize from a known distribution (see table underneath).

0.50 €	500 €
1 €	3,000 €
2 €	11,000 €
5 €	19,000 €
10 €	32,000 €
20 €	50,000 €
28 €	75,000 €
50 €	100,000 €
100 €	250,000 €
200 €	500,000 €

Table 1: prize distribution

Boxes' content ranges from 0.50 € to 500,000 €: the average prize is 52,045.83 €; the standard deviation of prizes is 120,953.44 €; the distribution of prizes is highly skewed.

The game then proceeds as follows; after a contestant is chosen from the 20 players, in each of the 10 game rounds, he/she opens several boxes (3 in the first 4 rounds, 1 in the following), foregoing the possibility of winning the prizes contained therein. In between rounds, the contestant receives an offer from the banker. The banker can offer the contestant either to swap the box with any of the unopened ones (i.e., unopened box of choice), or a certain amount of money to eventually accept and exit the game. If the contestant makes it up to end of the final round (i.e., no banker's money offers have been accepted) he/she wins the prize content of the box owned at such stage (in the Italian edition the prize is paid in gold tokens).
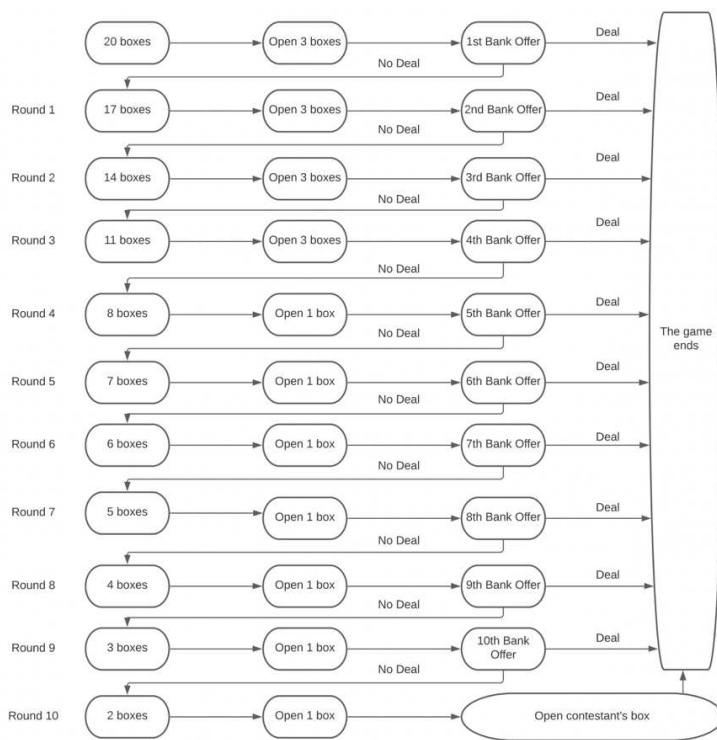
Figure 1: Game schematic description

Recently two special editions of "Affari Tuoi" aired on the Italian TV channel "Rai 1". One known as "Raddoppia"[1] with the players being duos of strangers (duos put together by the show production) and the other as "W Gli sposi"[2] where contestants were bride and groom to be (playing together as a couple).

Previous literature on "Affari Tuoi", even though limited, includes Di Cagno et al. (2008). They find that contestants are risk averse and that when observed heterogeneity is considered, the only relevant demographic variable is sex. In contrast with other literature, this dummy variable shows that in the sample the mean of the risk attitude parameter is higher for men than for women.

More extensive literature is available for non-italian "Deal or no Deal" editions.

The milestone paper written by Thaler et al. (2008) in contrast to the traditional assumptions of expected utility theory, illustrates that the round choices can be explained to a large extent by previous outcomes seen during the game. Their results in fact point towards prospect theory suggesting that path-dependence is relevant, even when choices are easy and well-defined and high real monetary amounts are at stake.

Our research question is to comprehend whether the behavior (i.e., degree of risk aversion) displayed by singlets during the standard edition of "Affari Tuoi" is different from duets' behaviour in the two special editions.

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[1] For the 2015 edition (ending on 06/01/2016), boxes' content ranges from 0.01€ to 500,000 €, the average prize is 52,095.84 €, the standard deviation is 120,911.41 the distribution of prizes is highly skewed. For the 2016 edition, boxes' content ranges from 0.50 € to 500,000 €, the average prize is 52,045.83 €, the standard deviation of prizes is 120,953.44 €, the distribution of prizes is highly skewed.

[2] Boxes content ranges from 0.50 € to 300,000 €, the average prize is 61,368.76 €, the standard deviation of prizes is 94,961.67 €, the distribution of prizes is highly skewed.

The key discriminant is as follows:

- "Affari Tuoi" standard edition: the contestant is a single individual

- "Affari Tuoi" raddoppia edition: the contestant is a duo of strangers - splitting equally the wins[3]

- "Affari Tuoi" W gli sposi edition: the contestant is a couple (bride and groom to be) - splitting equality the wins[4]

Building on previous literature, Zhang and Casari (2012), and Brunette et al. (2015) observe that individuals when in a group (of strangers) tend to be less risk averse (with weak or strong unanimity decision rule) while Morone, Nuzzo and Temerario (2021) results clearly display that individuals are more risk seekers than groups (of strangers) when confronted with gambles with positive expected payoff difference while being more risk averse in the opposite case.

They did not impose an exogenous disagreement-breaking rule, but left each group free to resolve the disagreement, the only restriction they imposed is that subjects had to come to a decision.

Morone and Temerario (2018) analysed dyads (group of 2 strangers) strategies in a one-shot public goods game. Employing a variation of the strategy-method they recorded larger self-regarding behaviour of dyads rather than individuals and a larger share of free riders when the decision units were dyads.

With regards to couple decision making when compared to individual decision making the literature is mainly in the field of psychology analysing the balance of power between the spouses, however we expect according to De Palma et al. (2011) the average couple to be less risk averse than its average components.

There is extensive literature investigating gender differences. Many scholars agree that women are more risk averse than men. Indeed, Byrnes, Miller and Schafer (1999) find that females responders display greater risk averse after analyzing 150 studies ranging from 1967 to 1997. Charness and Gneezy (2012) discover that women make smaller size investments in risky asset, therefore appearing financially more risk averse.

3. Data analysis

As explained in the introduction, the TV programme has been analysed by going through 3 different editions.

"Affari tuoi" standard: this is the traditional TV programme where we have one competitor. We will refer to this as *AFI*. This is by far the largest edition for episode number, therefore, to make it effectively comparable to the specials we set a sample size of 34 episodes (dating to 2015 and 2016).

"Affari tuoi raddoppia": This is an alternative version of the traditional tv programme. In this case we have as competitors groups of 2 individuals who do not know each other; we will refer to this edition as *AFG*. Both are contestants to the show and come from different Italian regions. 34 episodes in total were broadcast (during 2015 and 2016), it was possible to use 29 for our analysis, since 5 saw the banker propose in the last round a box swap instead of some monetary offer (rationale: a swap has no associable monetary value). Given the context of this edition, which provides in its rules for the split of the prize pool into 2 equal parts between subjects, it is strongly suggested in line with standard economic theory we compute expected values at individual level. Therefore, each episode analysed accounts for 2 observations (29*2 = 58)

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[3] The TV show regulations state that 2 separate payments of equal amount are made

[4] The TV show regulations state that 2 separate payments of equal amount are made

***"Affari tuoi W gli sposi"*:** as we can deduct from the title, the competitors of this edition are fiancés. We will refer to this as *AFC*. As in *AFG*, the prize won (as per edition regulation) is equally divided among the two future spouses. For analysis consistency, in line with AFG, each episode accounts for 2 observations. The edition was broadcast as a special after a 3 year "Affari Tuoi" hiatus, trying to attract revived viewers' attention after a decline in the TV show ratings. Therefore only 7 episodes were broadcast, of which 5 compliant with the pre-established canons necessary to be included in the analysis (i.e., being able to calculate CE and EV), providing us a with a total of 10 observations.

We can therefore summarise the data in table 2:

Name edition	Year edition	Number of competitors	Number of observations
Affari tuoi standard	2015-2016	1	34
Affari tuoi raddoppia	2015-2016	2 strangers	58
Affari tuoi W gli sposi	2021	2 in a relationship	10

Table 2: Summary of the sample, distinction by edition

A straightforward risk index (measured at the last played game round for each analysed episode) is a natural way to study if the type of group, i.e., a couple formed exogenously during the television program (AFG) and a couple in life (AFC), might influence choice behavior and risk aversion. This index is the calculated as the ratio between the certain equivalent (CE) - the monetary value offered by the banker - and the expected value (EV), which can be explained as, the expected monetary value of the lottery (in other words the average of the unopened boxes' monetary value). Based on the trend of this index we can assess the degree of risk aversion of the participants. It can take values greater than 0 (i.e., the banker's offer cannot be 0)

$$0 < \frac{CE}{EV}$$

Risk index formula

Where in line with literature:

- For values close to 0: the subject is **risk averse** (i.e., willing to accept a small banker's offer compared to the EV)

- For values close to 1: the subject is **risk neutral (**i.e., willing to accept an offer close to the EV)

- For values bigger than 1: the subject is **risk seeker** (i.e., willing to decline offers smaller or like the EV and to accept offers to some degree larger than the EV only - how large depends on the actual value taken, e.g., 2 means willing to accept offers double the amount of the EV or more -)

As we can infer from figure 2, the box plot highlights the presence of a different behaviour by couples with respect to groups and individuals who instead seem to behave in a similar way.

Table 3 shows a summary statistic regarding the mean risk index associated to each competitors' category. From a preliminary analysis we can confirm the visual results: AFI and AFG have a similar mean, while the mean of AFC is smaller. This gap may be explained by a difference in competitor's behaviour associated with the category of competitor (either a single individual, a group of strangers or a couple).

Risk index	Mean	Std.dev
AFI	0.713	0.238
AFG	0.754	0.295
AFC	0.619	0.376

Table 3: summary statistic of risk index by categories of competitors

To better verify our hypotheses, we ran two non-parametric tests, the Wilcoxon rank-sum (Mann-Whitney) test and the Kolmogorov-Smirnov test. We compared the different categories in pairs. As table 4 shows, comparing AFI and AFG, the risk index is not different, in fact, both the p-values are not statistically significant, in both, Wilcoxon rank-sum (Mann-Whitney) test and in the Kolmogorov-Smirnov test (0.6435 and 0.549 respectively). From the comparison with AFC, a statistical significance emerges. Nevertheless, this difference is more significant between couples and groups instead of couples and individuals. Moreover, in the Wilcoxon rank-sum test, the p-value of *AFI vs. AFC* is 0.0730 greater than the p-value (0.0368) of *AFG vs. AFC*. This level of significance is higher in the Kolmogorov-Smirnov test, where the p-value of *AFI vs. AFC* is 0.038 greater than the p-value (0.006) of *AFG vs. AFC*. These values corroborate our preliminary results: the behaviour of the couples differs from that of individuals and groups of strangers.

Focusing on the groups of competitors, considering the nature of the relationship, this analysis confirms the diversity of the risk index between the competing couples of *AFC* and the competing strangers of *AFG*. We can therefore state that based on the nature of the group, if they are a couple or two strangers, the risk aversion is different. Our analysis shows that couples display the greatest risk aversion.

Risk index	Wilcoxon rank-sum test (p-value)	Kolmogorov-Smirnov test (p-value)
AFI *vs.* AFG	0.6435	0.549
AFI *vs.* AFC	0.0730	0.038
AFG *vs.* AFC	0.0368	0.006

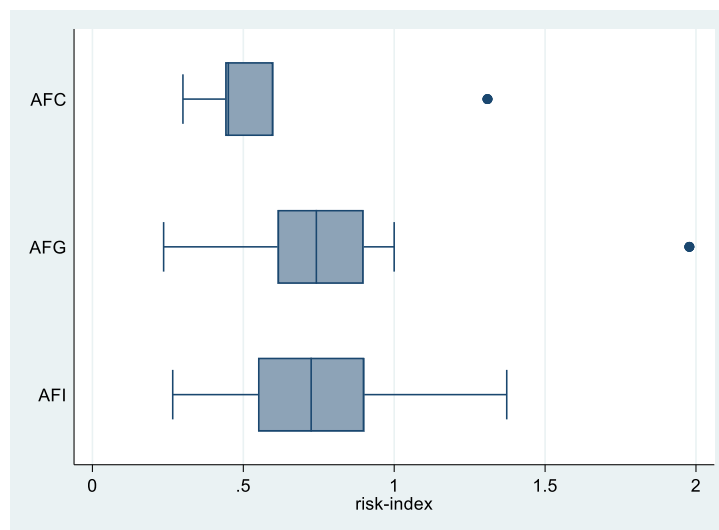*Table 4: Wilcoxon rank-sum test and Kolmogorov-Smirnov test by risk index*

Figure 2: Box plot of risk index for each category of competitor, AFI=individual, AFG= group, AFC= couple

As per the literature, risk aversion could also vary with gender. Our analysis, however, shows no difference based on the gender of our competitors. We generated a gender variable with a value from 1 to 5 (1 = female, 2 = male, 3 = female-male, 4 = female-female, 5 = male-male) by grouping all possible gender combinations and after running an Anova test[5] we can say that there is no variation in behaviour based on the composition of the couple.

4. Conclusions

A growing body of economic research is focusing on TV game shows and the behaviour displayed by their contestants. This paper contributes to the development of such literature while supplying an interesting extension by checking whether the actual decision taken varies alongside the type of decision maker.

To do that we compare "Affari Tuoi" standard edition (single contestant) with "Affari Tuoi raddoppia" (group of 2 strangers) and "Affari Tuoi W Gli Sposi" (bride and groom to be).

This addition proves particularly useful since in day-to-day life business, purchase, family etc. choices are usually taken by (small or large) groups rather than individuals.

To best of our knowledge such research insight applied to TV shows is absent in the current literature and this work could be a starting point for future applications.

When calculating the risk index our analysis shows no significant difference between decisions taken by individuals and groups of strangers while we find that couples (fiancés) display a more risk averse behaviour. Couple's higher recorded risk aversion is in contrast with De Palma et al. (2011) that find the average couple to be less risk averse than its average components. However, we could easily argument that this difference is due to a variety of factors: De Palma et al.'s treatment is within subject rather than between, most of their sample (more than 70%) is made of married couples and the average payoff is extremely little (around 50 euro) when compared to "Affari Tuoi" (around 150.000 euro). Married couples indeed are likely to have different mechanisms behind their decisions and when it comes to risk aversion per se is easy to understand why in Affari Tuoi "W Gli Sposi" conservative, safer and more risk averse choices are more likely when the context is taken into account; i.e. the couple is getting married soon with large expenses to budget for (in other words a smaller more certain amount might seem as more appealing than a larger but less likely amount).

Considering this, our results are therefore interesting because when playing with a stranger, contestants seem not to adapt their behaviour while when playing with someone they know extremely well (their fiancé) they seem to take more conservative decisions displaying greater risk aversion.

This paper could be a start for future research investigating the rationale behind such conduct to understand whether such pattern would also be observed in a context different from TV game shows.

Our insights could also provide important for further research to investigate the financial decisions taken by individuals, groups of people (i.e. businesses) and couples (engaged/married).

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[5] We cannot reject the null hypothesis, the p-value= 0.5004 is not statistically significant. We do not have gender differences.

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DECLARATIONS