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Should I Play or Should I Go? Individuals' Characteristics and Preference for Uncertainty

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Abstract: This paper presents an incentivized experiment analyzing the role of demographic characteristics in individual decision-making under uncertainty. Reactions to a natural source of uncertainty, payoffs in a TV game show, were measured using Fuzzy-set Qualitative Comparative Analysis (fsQCA), allowing us to identify multiple configurations of causal conditions that are sufficient for individuals to prefer an uncertain payoff to a sure gain, and, thus, lower risk aversion. This paper found evidence of preference for uncertainty, measured as willingness to play for an uncertain payoff, in individuals with characteristics most commonly present in the literature: being male; young; childless; with studies in finance or similar areas. This paper also shows that conditions that would not justify the preference for uncertainty according to the literature (an older individual or having children), when combined with other conditions, change contestants' behavior regarding preference for uncertainty. Individuals that are both older and single, and individuals that have children combined with education in finance, show an inverse effect on preference for uncertainty.

Keywords: preference for uncertainty; individuals' characteristics; risk aversion; socio-demographics; fsQCA; TV game show

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1. Introduction

Decision-making is a complex process that usually involves several levels of uncertainty. Given the importance of decision-making and its consequences, it is essential to understand how individuals make their decisions, and how individual characteristics affect the preference for uncertainty.

Several empirical studies analyze the relationship between decision-making under uncertainty and the characteristics of individuals ([1–6]). The characteristics previously proposed and investigated as possible determinants of the individuals' decision-making under uncertainty include, among others: gender, age, marital status, number of dependents, and education. Similarly, other variables can influence the decision-making under uncertainty, such as ethnicity ([7]), geographic location ([1]), or wealth ([1,2]).

We defined preference for uncertainty when an individual chooses a stochastic payoff rather than a guaranteed gain. In our study, preference for uncertainty occurs when a contestant decides to Game, having a 25% chance of winning a higher payoff if the answer is correct, and a 75% chance of lowering his current payoff if the answer is incorrect, instead of opting for No Game, guaranteeing a payoff, with a lower certain value. This concept is associated with risk-seeking behavior under uncertainty in the existing literature.

The aim of this paper is to disentangle the role that individuals' characteristics can play in individual decision-making under uncertainty, more specifically, to assess the complexity of the relationships between the variables and the preference for uncertainty. Based on

the analysis of 401 episodes of the JOKER television contest, we measured the impact of individual characteristics in decision-making under uncertainty. Results show evidence of preference for uncertainty when the contestant is male; young; without children; and with studies in finance. This paper also demonstrates that combinations that were not expected to justify the preference for uncertainty, according to the literature, namely being older or having children, when combined with being single or having studies in finance, respectively, show a behavior of preference for uncertainty.

2. Literature Review

This section presents a review of the relevant literature, which is divided into subsections with a brief review of each individual characteristics that affect a preference for uncertainty.

2.1. Gender

Many empirical studies explored gender differences to explain the preference for uncertainty in terms of decision-making ([1,8–12]). Most empirical literature is consensual regarding the fact that women are more averse to uncertainty than men ([6,13–18]).

Two of the first empirical studies that looked at the differences between women and men in decision-making under uncertainty were conducted by Cohn et al. [19], who collected data from a survey to clients of an American brokerage firm, and Riley and Chow [1], who used data on the actual allocation of assets of a random sample of the population of the United States of America. Both studies concluded that men tend to prefer investments with more uncertain returns.

Subsequent studies, such as the one by Bajtelsmit and Vanderhei [8], concluded that, even when controlling for variables such as wealth and age, women generally choose pension fund options with less uncertainty of return. Similarly, Sunden and Surette [9] used data from the Survey of Consumer Finances—between 1992 and 1995—and reported that women tend to choose less risky pension funds. Warner and Cramer [20] explored the saving behaviors of baby boomers and found similar results. Based on a laboratory experiment, where individuals are asked to choose between five alternative options that differ in terms of expected return and variance, Eckel and Grossman [21] concluded that men choose, on average, riskier options with higher expected returns. Motivated by the work of Kahneman and Tversky [22], the former authors also demonstrate that the highest average level of risk aversion in women remains both in the domain of losses and in the domain of gains.

Jianakoplos and Bernasek [14] explored the gender difference in the preference for uncertainty in asset allocation, and concluded that single families headed by women, or couples, are more risk averse than families headed by single men. Men tend to have higher levels of confidence than women, and, in this sense, are willing to take more risk in their decisions ([23–25]). Byrne and Worthy [26] suggest that men and women differ in decision-making because women tend to decide according to the frequency of the reward, or they search for options that offer consistent rewards even if smaller, whereas men look for options with the highest possible returns. These conclusions are also corroborated by the study developed by Barber and Odean [23], in which they concluded that men have higher levels of confidence than women, and, in this sense, tend to opt for the preference for uncertainty in their investments. This study demonstrates, therefore, that men are more confident regarding investments, which makes them assume a riskier profile. Dwyer et al. [27] demonstrate that gender differences in decision-making under uncertainty can be driven by a financial knowledge divergence between men and women. These authors conducted a study with a sample of 2000 investors in mutual funds and found that women take less risk than men in their investment decisions. However, when monitoring knowledge about financial markets and investments, the differences between genders become significantly reduced, with a greater risk-taking being shown by the female gender. A similar conclusion is presented in the study by Bajtelsmit and VanDerhei [8], and even

though they show that women invest a relatively larger fraction in low-risk assets, when compared to men, the authors justify that this difference between genders can be explained by the socioeconomic status, wealth, or financial knowledge, which the authors were unable to monitor in their study. However, Jetter and Walker [28] tested for how gender might influence performance and preference for uncertainty in contests, concluding that women appear to be more aggressive and (marginally) more competitive, as well as taking on more risk.

2.2. Age

Several studies focused on another demographic—age—and concluded that older individuals are more averse to uncertainty when compared to young individuals ([3,29–34]).

According to Aren and Canikli [34], the main explanatory factors are the fact that older individuals prefer investments without uncertainty, assuming lower but consistent returns, due to the reduction of their cognitive abilities in terms of information analysis regarding investments with uncertain returns.

However, the literature is not always consistent. Some authors reveal that the choice for uncertain investments increases until a certain age ([1,14,35]). Jianakoplos and Bernasek [14] found that single women have a decline in tolerance for uncertainty when they reach the ages between 36 and 40 years old. Bougherara et al. [36] found that older and female individuals make more uncertainty-avoiding and more skewness-seeking choices.

Other authors have shown that older individuals behave similarly to young individuals under uncertainty (for example, [33,37–39]). Clark and Strauss [37] obtained evidence that both older and younger individuals have the same level of propensity for uncertainty; however, middle-aged individuals tend to be more conservative. According to the authors, this conclusion can be explained by the accumulation of wealth that compensates for uncertainty in investments for older individuals. Mata et al. [33] found that older individuals make decisions under uncertainty in gain scenarios and decide in favor of gain certainty in loss scenarios. As these authors demonstrated, applying the Tversky and Kahneman framework effect [40], older individuals are more sensitive to utility in the gain domain than in the loss domain.

Best and Charness [41] also concluded that the difference in decision-making under uncertainty between younger and older individuals only occurs when the decision is based on low values. In these cases, older individuals are less likely than young individuals to choose investments with uncertain returns, as a way to guarantee the maximization of their usefulness, and they are also more likely to maintain their current resources. The authors report that this age effect disappears when the values at stake are substantially high.

Sproten et al. [42] observed that the decision-making behavior of older individuals differs in part from the behavior of younger individuals. Under conditions of uncertainty, older individuals behave like young individuals, only if the a priori probabilities apply. Young individuals are more averse to uncertainty if they do not get any feedback, and older individuals are more averse to uncertainty when it comes to estimates.

2.3. Marital Status

Several studies also point to marital status as a factor that influences uncertainty-aversion in decision-making. Some of these studies report that single individuals are more prone to uncertainty than married individuals ([3,19,43–46]).

Nosita et al. [47] present, as a main reason, the levels of responsibility of married people compared to those of unmarried individuals. This is in line with the results of research by Roszkowski et al. [43] concluding that responsibility increases along with marriage and having children. On the onset, a couple has greater financial responsibility, especially when there are dependents; therefore, they have less tolerance for uncertainty. In addition, the authors also claim that couples can face greater social risks, such as deprivation of their social status, due to the loss of an investment.

However, other studies reveal that married individuals are more tolerant to uncertainty, since they have greater financial margins to absorb negative results ([2,48]). Schooley and Worden [49] justify these results with the fact that married individuals usually have two incomes, whereas other studies found no significant relationship between marital status and decision-making under uncertainty ([1,44,50–52]).

Chaulk [53] finds that, with an increase in disposable income, both single and married individuals increase their tolerance to uncertainty. This increase is more pronounced for married individuals when compared to single individuals. For both groups, an increase in income justifies a greater margin to recover from unexpected losses.

2.4. Number of Dependents

The number of dependents is also a studied variable in terms of understanding the behavior in decision-making under uncertainty. However, most of the empirical literature present statistically non-significant results. This variable is sometimes integrated into the analysis of the marital status variable, where it is assumed that married people with dependents have less preference for uncertainty (for example, Roszkowski et al. [43]).

Daly and Wilson [54] suggest that the responsibilities accompanying marriage and children make individuals less tolerant to uncertainty. Warner and Cramer [20] compared individuals without children to individuals with children, and the latter were less tolerant to uncertainty, which led to the assumption that they demand certainty in the return of their investments. Chaulk [53] also concluded that individuals with children are less likely to be tolerant to uncertainty than those who do not have children, regardless of their age or gender. In addition, Nosita et al. [47] observed that when married couples have children, they will be more concerned about uncertainty, and try to reduce risk by transferring those risks, namely by buying health insurance, education insurance, and life insurance. The risk transfer is an effort to reduce uncertainty in the future.

On the other hand, Jianakoplos and Bernasek [14] reported that as the number of young dependents increased in a family, the greater the proportion of assets with uncertain returns was. However, in single women's households, investment in assets with uncertain returns decreases as the number of children increases. It should be noted that in the study by Jianakoplos and Bernasek [14], they considered the number of individuals under the age of 18 as an independent variable and recognized that the dependents could be younger siblings or relatives. Xiao [55] also achieved similar results in families with small children. Most do not invest in assets with uncertain returns. However, families with children aged between 6 and 11 years old, and in their teens (between 12 and 17 years old), tend to prefer uncertainty in their investments.

Hallahan et al. [3] found no evidence linking the existence of children in a family with attitudes towards preference for uncertainty. Schooley and Worden [49] found that the relationship between the number of dependents and tolerance to uncertainty is insignificant. Therefore, the literature shows contradictory results regarding this variable, and it is still not possible to define whether the number of dependents can significantly affect the individuals' preferences for uncertainty.

2.5. Education

Another factor that seems to influence an individual's tolerance for uncertainty is their level of education. Several studies have shown a positive relationship between tolerance for uncertainty and the level of education. The argument is that individuals with higher levels of education are better prepared to assess the risk–return relationship, which leads to a greater tolerance for uncertainty ([1–3,5,44,47,56–58]).

Baker and Haslem [56] argue that less educated individuals prefer less-volatile assets. Riley and Chow [1] concluded that aversion to uncertainty decreases with the level of education, because the individual's understanding of complex financial products increases. Sung and Hanna [57] reinforce the idea of Riley and Chow [1] due to the individual's ability to understand the differences in the nature of the risk. Grable [2] concludes that

individuals with a higher level of education are less averse to uncertainty, i.e., they have higher levels of financial knowledge. Hallahan et al. [3] also found a positive relationship between education and the degree of risk tolerance. These authors assessed the wealth of individuals over 60 and concluded that approximately half of the millionaires had a higher education degree and only 9% did not complete their secondary education. Booij et al. [58] state that less-educated individuals show greater aversion to uncertainty. Bayar et al. [59] affirm that as the awareness of individuals of financial knowledge increases, they tend to have a preference for uncertainty. Although, it is evident that income level is also an important determinant of high financial risk tolerance. However, Sjoberg and Engelberg [60] demonstrated that this aversion to uncertainty, in addition to being related to the level of education, also depends on the degree of specialization. Finance students demonstrated a greater degree of tolerance to uncertainty than the general population. Besides, according to Gaudecker [5], the role of financial knowledge is quite relevant, and is related to the returns. Families with above average financial literacy tend to get higher returns than families with lower levels of financial literacy.

Based on the theoretical background, the following testable hypotheses are formulated:

Hypothesis 1 (H1). *Gender preference. Men are more likely to prefer uncertainty when compared to women.*

Hypothesis 2 (H2). *Age preference. The preference for uncertainty decreases with age.*

Hypothesis 3 (H3). *Marital status preference. Single people are more likely to choose uncertain options than married people.*

Hypothesis 4 (H4). *Child preference. Individuals without children have a greater preference for uncertainty in their decisions.*

Hypothesis 5 (H5). *Education preference. Individuals with an education in finance or similar show a greater preference for uncertainty in their decision-making.*

3. Model of the TV Game Show

This section presents the model of the game show "JOKER" that may be useful to interpret this paper's results. However, the non-interested reader can jump directly to the methodology at the end of this section.

The game model we present here is responsible for the dynamic structure of the whole game. Initially, we present a simplified version of the game in which we assume the contestants are neutral in terms of uncertainty and, therefore, maximisers of the expected result. Next, we consider aversion to uncertainty in a very direct way, but that allows us to maintain the structure presented. p represents the probability of a contestant (with a certain level of knowledge) answering the question correctly, where p is a realization of the random variable p with a cumulative distribution function F.

A contestant may reach the last question (the only question where he/she must decide with uncertainty whether or not to play) at any of the levels, that is, $n = 7, \ldots, 1$. So, a_n is the representation of the monetary values accumulated up to the twelfth question. The monetary value at stake in the last question can correspond to any of the game levels because it depends on the contestant's performance in the previous eleven questions, where $\{a_n\}_{n=1}^{7} = \{50,000,\ 10,000,\ 3000,\ 1000,\ 500,\ 200,\ 0\}$. Likewise, a_{n+3} is the value of the fall from the previous gain level, that is, the gains that can be maintained in the event of a wrong answer. So, if in the twelfth question the contestant is at the 3000 euros level, the value of continuing the game is given by:

$$V_{3000}(p) = max\ \{a_4, p(f_2) + a_6\} \quad (1)$$

Thus, we can generalize this model, so that when there are n possible levels in the twelfth question, it can be successfully answered with a p probability, and the value of the game is:

$$V_n(p) = a_{n+1}, p(f_{n-1}) + a_{n+3} \tag{2}$$

$$f_{n-1} = \mathrm{E}[V_{n-1}(P)] \tag{3}$$

We define $F_0 = a_1$. It is important to note that the decision to play or not in the last question is made after the question is presented. There is a critical value for p,

$$\overline{p_n} = \frac{a_{n-1} - a_{n+3}}{(f_{n-1}) - a_{n+3}} \tag{4}$$

for a value maximiser, so that if $p \leq \overline{p_n}$, the individual gives up the game and, therefore:

$$V_n(p) = a_{n-1} \tag{5}$$

On the other hand, if $p > \overline{p_n}$, and a contestant answers the question, the value of the game is:

$$V_n(p) = p(f_{n-1}) + a_{n+3} \tag{6}$$

The following equation represents the relation for $\{f_n\}$:

$$f_{n-1} - f_n = (f_{n-1} - a_{n+3}) \int_{\overline{p_n}}^{1} F(p)dp \tag{7}$$

To obtain the probability, we need to assess the probability of gain. The probability of a contestant deciding to answer the twelfth question, with a preview of it, is:

$$P_r\left['Game'\right] = 1 - F(\overline{p_n}) \equiv \overline{F}\,(\overline{p_n}) \tag{8}$$

The probability that a contestant will give the correct answer, after making the decision to answer, is given by:

$$P_r['Win'|'Game'] = \int_{\overline{p_n}}^{1} \frac{pdF(p)}{1 - F(\overline{p_n})} \equiv \frac{\overline{G}(\overline{p_n})}{\overline{F}(\overline{p_n})} \tag{9}$$

where the probability of answering correctly is simply:

$$P_r\left['Win'\right] = \overline{G}\,(\overline{p_n}) \tag{10}$$

The extension to allow a preference for uncertainty, as opposed to neutrality, is accommodated simply by allowing the premiums to be measured in terms of utility, that is, we consider $a'_n = u(a_n)$, $n = 1 \ldots 7$, for some increasing utility function $u(x)$ with $u(0) = 0$.

4. Materials and Methods

This section presents the details about data and the methodology used for examining the role of the individuals' characteristics in preference for uncertainty.

Data were collected using recordings of the programs, which were obtained from RTP 1, the broadcaster of the JOKER TV game. We examined 401 games shown between 27 August 2018 and 3 October 2020. The JOKER television contest consists of a game in which contestants answer twelve general knowledge questions that vary in difficulty and time to answer according to the level of the payoff. In each question, the contestant has 4 possible answers (25% probability per option). If a correct answer is chosen, the contestant climbs one level in the payoff ladder; with each incorrect answer, they drop three levels in the payoff ladder. The game ends with the twelfth and final question, where contestants can choose to either Game or No Game. If they opt for Game, and answer correctly, they

win a higher payoff. If they answer incorrectly, they win a lower payoff (three levels below). If they opt for No Game, they receive an insurance payoff (one level below).

We collected the sociodemographic characteristics of the contestants because these characteristics have significant explanatory power in the study of the preference for uncertainty. Any of the JOKER's contestants have their own demographic characteristics, life experience, a certain level of knowledge, areas of interest, and other pre-game factors that are determinant in their decisions during the game and may affect the decision under uncertainty.

The characteristics we were able to analyze in advance, and that are the individual characteristic variables, are Gender as a dummy and binary variable, which is equal to 0 if the contestant is male and 1 if female; Age, which we defined as a categorical variable with three categories, according to what the vast majority of previous studies present (see metadata of Best and Charness [41]): 0—if young up to 30 years old, 1—if adult up to 59 years old, and 2—if older than 59 years old; Marital Status, as a binary variable, which is equal to 0 if the individual is married (includes common law unions), and 1 if the individual is single (includes divorced, separated, or widowed); the Number of Dependents was defined as a binary variable, which is equal to 0 if the individual does not have children, and 1 if the individual has children; and Education as a binary variable, which is equal to 0 if the individual has an education in finance or similar areas, and 1 if they have an education in other areas.

It is important to note that some of the variables were estimated based on the contestants' physical appearance and the information provided in the contestants' introductory presentation. For example, in some cases, the contestants' level of education was not explicitly mentioned, although that was often clarified by the declared profession. We estimated the missing values for age based on the physical appearance of the contestants and on the information revealed in their presentation, such as, for example, the age of their children, how long they have been working, or have been married, among others. In addition, we used the education variable to analyze the area of study, since approximately 99% of the individuals being studied had a higher education degree, and, therefore, it would not be feasible to evaluate this variable as the level of academic education, as most studies consider it. Therefore, based on the results of previous empirical investigations (for example, Sjoberg and Engelberg [60]), we hypothesize a greater preference for uncertainty in individuals with studies in finance or similar.

To test the hypotheses regarding the influence of the individual characteristics on decision-making under uncertainty, we estimated the decision to play the last question as a series of independent samples *t*-tests and one-way ANOVA tests on the explanatory variables. The remaining demographic characteristics are not statistically significant, although they present the correct signal. These results may appeal to the idea of complex relationships between individual characteristics and a preference for uncertainty. To strengthen the analysis of the demographic characteristics, we used the Fuzzy-set Qualitative Comparative Analysis (fsQCA) methodology, which allowed us to present a more qualitative analysis of these variables. The fsQCA is particularly suitable for our study as it allows us to identify multiple configurations of causal conditions that are sufficient for a given outcome, that is, when a contestant has a preference for uncertainty in the twelfth question ([61–64]). We used fsQCA over conventional regression analysis because it allows us to identify the configurations of causal conditions ([65,66]) that are present or absent when a given result occurs. The fsQCA also allows us to verify if the causal conditions present or absent in the occurrence of a given result (to play the Game) are different and asymmetrical from the causal conditions that are present or absent when the same result does not occur (not playing the Game) ([61,65–68]).

5. Results

5.1. Summary Statistics

In terms of individual characteristics, we concluded that 69% of the contestants in the JOKER contest are male. Regarding the age group, adults (between 31 and 59 years old) are the most representative group, accounting for approximately 72% of the contestants. As for marital status, married contestants are the group with the highest representation (63% of the contestants). In terms of the number of children, we have a very bipolar sample, with 54% of the contestants having no children, and 46% having children. Regarding the contestants' area of education, 13% of contestants have degrees in finance or similar, and 87% have degrees in a different area.

5.2. Bivariate Analysis

In Table 1, we present the estimated marginal effects and the *p*-values for each of the individual characteristic variables.

Table 1. Bivariate analysis: demographic characteristics.

Demographic Characteristics	Test	Groups	N	Mean	Std Dev.	Coeff.
Gender	t-student	Male Female	275 126	0.74 0.74	0.440 0.441	0.000
Age	ANOVA	Young Adult Older	69 290 42	0.72 0.73 0.79	0.450 0.442 0.415	0.287
Marital status	t-student	Single Married	148 253	0.79 0.71	0.408 0.456	14.738 *
Children	t-student	No Yes	218 183	0.75 0.73	0.435 0.447	0.891
Education	t-student	Financial Other	52 349	0.79 0.73	0.412 0.444	3.716

Note: * Significant at the 1% level.

The preference for uncertainty, regardless of whether the contestant is male or female, is exactly the same (0.74); consequently, the difference in the averages is not statistically significant to explain the decision to play the game (*p*-value > 0.10), assuming an equality in variances for both groups. This is a result similar to the studies by Bajtelsmit and VanDerhei [8] and Dwyer et al. [27], in which, when monitoring knowledge in an area, the differences between genders are reduced or non-existent.

The result is similar for the variable age of the contestants, where the average of preference for uncertainty is similar across all age groups, being slightly higher among older people (0.79). According to the ANOVA test, there are no differences in the averages between the three age groups (*p*-value > 0.10). This result is in line with studies by several authors showing that older individuals behave similarly to young individuals under uncertainty (for example, Clark and Strauss [37]; Henninger et al. [38]; Mata et al. [33]; Tymula et al. [39]). In addition, Sproten et al. [42] found that, in conditions of uncertainty, older individuals behave like young individuals when the a priori probabilities apply, as in the JOKER contest where the probabilities of gain or loss are known beforehand.

Both married contestants (0.71) and single ones (0.79) show a preference for uncertainty higher at the center of the scale, which is slightly higher for singles. The difference in the averages is statistically significant (*p*-value = 0.00). Therefore, the idea that single contestants are more likely to play in the 12th question is valid and similar to other studies that report that single individuals are more prone to uncertainty than married individuals (Cohn et al., 1975 [18]; Roszkowski et al., 1993 [42]; Grable and Lytton, 1998 [43]; Hallahan et al., 2004 [3]; Yao and Hanna, 2005 [44]; Roussanov and Savor, 2014 [45]).

Both contestants with children (0.73) and contestants without children (0.75) show a preference for uncertainty higher at the center of the scale, which is slightly higher in contestants without children. The difference in the averages is not statistically significant (p-value > 0.10), which is a result consistent with the empirical literature, where the majority present statistically non-significant results. Several studies suggest that families with dependents have less preference for uncertainty, because there is an increase in the responsibilities that accompany a marriage and children, making them less tolerant to uncertainty (see, for example, Roszkowski et al. [43]; Warner and Cramer [20]; Daly and Wilson [54]; Chaulk [53]).

Both in contestants with studies in finance or similar fields (0.79), and in contestants with studies in other areas (0.73), the preference for uncertainty is higher than equal odds, being slightly higher in the contestants with education in finance or similar fields. The difference in the averages is not statistically significant (p-value > 0.10). As Sjoberg and Engelberg [60], and Gaudecker [5] demonstrated, the preference for uncertainty depends not only on the level of education, but also on the degree of specialization. Therefore, our result is in line with these two studies in which individuals with a background in finance or similar areas demonstrated a greater degree of tolerance to uncertainty than individuals with degrees in other fields.

5.3. Probit Regression

Regarding the question of whether there is a typical profile for the individual with a preference for uncertainty, we estimated the Probit Regression. The choice for this regression methodology is based on the preference for uncertainty proxied by playing or not playing (binary). Thus, the Probit Regression is intended to estimate the impact on the probability of uncertainty being preferred, as modelled by Equation (11).

$$Game = f\{Gender;\ Age;\ Martial;\ Child;\ Education;\ Level;\ Right\ Answer;\ Latency;\ Confidence\} \quad (11)$$

By analyzing the results presented in Table 2, we verified that gender and marital status are the only significant demographic variables, validating that men show more preference for uncertainty than women (as observed by Slovic [13]; Jianakoplos and Bernasek [14]; Finucane et al. [7]; Badunenko et al. [15]; Croson and Gneezy [16]; Saraiva [17]; Charness and Gneezy [18]), and single people are more prone to uncertainty than married individuals (as observed by Cohn et al. [19]; Roszkowski et al. [43]; Grable and Lytton [44]; Hallahan et al. [3]; Yao and Hanna [45]; Roussanov and Savor [46]).

Table 2. Probit Regression.

Game	Coef.	Std.	Err.	Z	$p > \|z\|$	(95% Conf. Interval)
Gender	−0.6359278	0.2846669	−2.23	0.025 **	−1.193865	−0.0779909
Age	0.6436297	0.5639318	1.14	0.254	−0.4616562	1.748916
Marital	−0.6042121	0.2763995	−2.19	0.029 **	−1.145945	−0.062479
Child	−0.1027091	0.2846632	−0.36	0.718	−0.6606388	0.4552206
Education	−0.1573171	0.376211	−0.42	0.676	−0.8946771	0.5800428
Level	−1.278533	0.6375427	−2.01	0.045 **	−2.528094	−0.0289721
Right Answers	−0.2384943	0.6992652	−0.34	0.733	−1.609029	1.13204
Latency	−11.03302	1.516197	−7.28	0.000 ***	−14.00471	−8.06133
Confidence	0.8659587	0.3564396	2.43	0.015 **	0.1673499	1.564567
_cons	9.10619	1.300762	7.00	0.000	6.556743	11.65564

Notes: χ^2 = 0.000; Log Likelihood = −71.16; Pseudo R^2 = 0.6914; 0 failures and 139 successes completely determined. *** significance level 1%; ** significance level 5%.

The remaining demographic characteristics are not statistically significant, although they present the correct signal. These results may appeal to the idea of complex relationships between individual characteristics and a preference for uncertainty. To strengthen the analysis of the demographic characteristics, we used the Fuzzy-set Qualitative Comparative

Analysis (fsQCA) methodology, which allowed us to present a more qualitative analysis of these variables.

There are actual empirical differences in the individual characteristics analyzed, which end up not being reflected in a statistically significant way. However, they can have different results if assumed in a non-linear way, which allows us to have a qualitative analysis of these individual characteristics. To have a more qualitative analysis of the individual characteristics, we used the fsQCA methodology, and from the analysis of the necessary and sufficient conditions, we evaluated the degree of influence of the individual characteristics in the preference for uncertainty from a set of aspects that present different combinations for the same outcome.

5.4. Fuzzy-Set Qualitative Comparative Analysis

After a first linear analysis of the independent variables, we validated that they are in accordance with the reference literature. However, for the most part, the individual characteristics are not statistically significant, which may indicate that the variables may have complex relationships.

To apply the fsQCA, a calibration of variables is necessary. In our study, we used the 5%, 50%, and 95% percentiles to establish the anchors for "Fully-out", "Maximum Ambiguity", and "Fully-in" (Table 3). We did not use exact one and zero as breakpoints because the two association scores would correspond to the universal maximum and minimum ([69]). Thereafter, we verified the existence of causal conditions necessary for an outcome to occur (Game or No Game), and none of the individual and game characteristics are necessary conditions (>90%). Based on the Truth Table Algorithm, we analyzed the sufficient causal conditions, identifying the configurations of causal conditions that are consistent ([65,66]).

Table 3. Variables and calibration anchors.

Variables	Fully-Out	Maximum Ambiguity	Fully-In
Gender *	0	—	1
Age	0.05	0.5	0.95
Marital *	0	—	1
Child *	0	—	1
Education *	0	—	1
Level	1	4	7
Right Answer	5	8	11
Latency	1	40	62
Confidence	0	0.5	1

Note: (*) Discrete variables. The causal condition is present (1) or absent (0).

The fsQCA sufficiency analysis provides the complex, parsimonious, and intermediate solutions, and the associations are measured by consistency and coverage ([66,70]). Solutions are considered informative when consistency is above 0.75, and coverage is between 0.25 and 0.65 ([67]).

Considering the five causal conditions selected for this analysis (which could lead to a maximum of 32 possible configurations for each solution), Table 4 presents the existence of three configurations for the preference for uncertainty.

Configuration three (S3 in Table 4) comprises the necessary conditions advocated in the literature, which reinforce the personal characteristics most commonly present in the preference for uncertainty: being male, young, childless, and with studies in finance or similar areas (see, for example, Sjoberg and Engelberg [59]; Gaudecker [5]; Aren and Canikli [34]). This result demonstrates that young, childless men are more prone to uncertainty, and when they have above-average financial knowledge, they demonstrate a greater degree of uncertainty tolerance when compared to other contestants (they justify 22% of the results).

Table 4. Fuzzy-set Qualitative Comparative Analysis: preference for uncertainty and individuals' characteristics.

Configuration	S1	S2	S3
Gender			○
Age	●		○
Marital	○		
Child		●	○
Education		○	○
Consistency	0.81	0.83	0.78
Raw Coverage	0.17	0.08	0.22
Unique Coverage	0.10	0.07	0.16
Overall solution consistency	0.40		
Overall solution coverage	0.80		

Note: Black circles (●) indicate the presence of a condition, and white circles (○) indicate its absence. Large circles indicate a core condition, and small circles indicate a peripheral condition. Blank space indicates a "don't care" condition.

In the other two relevant solutions, we found in each a condition that would not justify the preference for uncertainty according to the literature (an older individual and having children), but that when combined with other conditions, changes the contestant's behavior regarding a preference for uncertainty. Configuration one (S1 in Table 4) exhibits the causal conditions of older and single individuals, indicating that older individuals behave similarly to young individuals under uncertainty in the absence of family responsibilities (in line with, for example, Clark and Strauss [37]; Henninger et al. [38]; Mata et al. [33]; Tymula et al. [39]). In fact, older individuals may have a greater accumulation of wealth, and, as such, take on a greater preference for uncertainty. In the last configuration (S2), individuals with children would be a condition to opt for the certain gain, according to the literature (for example, Roszkowski et al. [43]), but combined with an education in finance or similar areas, allows contestants to show a preference for uncertainty. Among the contestants, the individuals with greater financial knowledge are in a better position to make more appropriate financial decisions, consequently achieving a more efficient intertemporal allocation of their wealth. Therefore, they are in more advantageous conditions than the other contestants to decide for a preference for uncertainty, even when they have dependents in their charge.

To ensure the robustness of the fsQCA analysis, we performed additional analysis using an inclusion cut-off point other than 0.9. In the sample, the use of this cut-off revealed the same number of configurations, but did not influence pool levels or between-consistency and coverage. With a similar purpose, the Boolean analysis was performed to test the causal conditions for the no-play option. We verified that there are no stable configurations regarding the negation of a preference for uncertainty. Results are not tabulated.

6. Discussion

In this paper, we conducted research to investigate the effects of individuals' characteristics in their decision-making under uncertainty.

In order to answer the research hypotheses, we used data from 401 episodes of the JOKER television contest to test behavioral hypotheses. We found that in the relationship between preference for uncertainty and individuals' characteristics, there are complex relationships. When trying to validate whether there is a typical profile of an individual with a preference for uncertainty, we estimated a Probit Regression, where it was possible to verify that, except for the variables gender and marital status, the remaining sociodemographic characteristics have the same sign presented in the reference literature, but they are not statistically significant. These results may indicate that the variables may have complex relationships. To assess the complexity of the relationships between the variables, we used the Fuzzy-set Qualitative Comparative Analysis (fsQCA), which allowed us to present a

more exploratory and qualitative analysis of the variables, anchored in the complexity of the relationship between the variables.

The results obtained revealed that the individual characteristics most commonly present in the literature, that is, being male, young, without children, and with studies in finance or similar areas, are more prone to uncertainty, and when they have above-average financial knowledge, they show a greater preference for uncertainty compared to other contestants. An additional contribution of fsQCA was to evidence the existence of alternative characteristics that would not justify the preference for uncertainty according to the literature (older individual, and having children), but combined with other conditions (single marital status, and education in finance areas), change the behavior of individuals in terms of a preference for uncertainty. These results may be useful in explaining the previous mixed evidence. The existence of equifinal solutions in which certain conditions may be present or absent may explain why, in certain contexts, under certain sample characteristics, the results may show the significance of individuals' characteristics, where, in others, this significance is not observed or is observed with an opposite sign. Based on the interpretation of the results, we can only validate hypotheses H1a and H1c. However, this work contributes to the debate on the role of individual characteristics in the preference for uncertainty.

Finally, it should be noted that previous research has also addressed game-specific variables as relevant in the context of risk preferences. As a potential venue for further research, we argue that from the point of view of the configurational analysis, it will be important to understand how these variables interact with the individuals' characteristics.

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