2021

Studying the Relationship Between Financial Risk Aversion and Income with the Jeopardy! Daily Double

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STUDYING THE RELATIONSHIP BETWEEN FINANCIAL RISK AVERSION AND INCOME WITH THE JEOPARDY! DAILY DOUBLE

A Capstone Experience/Thesis Project Presented in Partial Fulfillment

of the Requirements for the Degree Bachelor of Science

with Mahurin Honors College Graduate Distinction

at Western Kentucky University

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May 2021

*****

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ABSTRACT

It has long been up for debate as to whether there is a link between financial risk aversion and income. This study's purpose is to, using data from the game show *Jeopardy!*, investigate this question through analytical research. This study made use of multiple regression analyses in order to examine the relationship between income and risk aversion in *Jeopardy!* contestants who appeared on the show between January 2019 and October 2020. Specifically, this study looked to isolate the potential impact a contestant's estimated annual income had on their willingness to bet on the *Jeopardy!* Daily Double question. It was found that, under all tested circumstances, a contestant's estimated annual income had an insignificant positive impact on their willingness to bet a larger percentage of their respective pot. This study provides evidence that suggests there may be little-to-no significant correlation between income and financial risk aversion in individuals. Further studies could expand this research through the investigation of bettor rationality; such information could then be used to further isolate the impact of income on contestant risk aversion.

I dedicate this thesis to my parents, friends, and professors, who all encourage me to go beyond what I consider possible of myself.

ACKNOWLEDGEMENTS

I have to give a tremendous amount of thanks and gratitude to Dr. Susane Leguizamon and Dr. Stephen Locke, who have both been unbelievably helpful and patient throughout this entire process. During a year ravaged by uncertainty, both of them went out of their way in order to provide mentorship and assistance during the process of this project. In addition, I would like to thank the many professors in the Economics and Mathematics departments that provided me with the knowledge to complete this project, as well as the professors in the English department who turned me into a competent enough writer to write this paper.

VITA

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INTRODUCTION

Risk aversion plays a part in nearly every decision we make in life, including decisions regarding money. Although economists typically study financial risk aversion, most everyone has an interest and opinion on the subject. While risk aversion may have an impact on the building of wealth, there is no consensus on whether it is wise to be financially risk averse. Many people would argue fortune literally favors the bold, whereas many others would say that people become wealthy through prudence.

There are few better natural experiments for studying risk aversion than game shows. Game shows force contestants to make snap-second decisions that will result in their possible, often monetary, gain or loss. The fairly controlled environment of a game show allows for these decisions to be isolated in such a way as to limit the endless outside variables of day-to-day life. One of the most reputable and long-running American game shows is *Jeopardy!*, where three contestants must answer questions correctly in an effort to accrue more points than their opponents. The winner of the game gets to play again, but all contestants get to keep their points (recorded in dollars), which forces contestants to play the game somewhat rationally. Perhaps the most interesting part of *Jeopardy!* is the Daily Double concept, in which a single contestant stumbles upon an opportunity to wager as much of their pot on a question as they want. This presents researchers with a true golden opportunity to study risk aversion, and many have done so, such as He et. al (2008) and Simon (2018). However, most research on this phenomenon has either focused on bettor rationality or risk aversion with respect to gender. Through the prism of the *Jeopardy!* Daily Double, this thesis looks to study the relationship between a contestant's risk aversion and their estimated annual income.

Using data calculated from *Jeopardy!* games from January 2019 to October 2020, I isolated the relationship between a contestant's aggressiveness in wagering on the Daily Double question and their estimated annual income. Going in, I predicted that these two variables would have a negative correlation, but their relationship would be variant. Ultimately, I found that the correlation was positive but highly variant. This would seem to suggest that, while high-income people do tend to be less risk averse, it is unlikely that there is any causality between income and risk aversion, at least within the context of a game show. These results would support the larger idea that the events that lead to one's relative success are highly random, and a person's willingness toward risk can have a positive or negative impact on their ability to build wealth.

LITERATURE REVIEW

While there is not any previous literature on this specific avenue of research, there are tangential studies that explore risk aversion in game shows in various ways. Particularly, there is a bevy of literature studying how gender and risk aversion interplay during game shows. For instance, a paper by He et. al (2008) studied differences in risk aversion with respect to issue capability, a measure of perceived confidence, between men and women while playing *Jeopardy!*. They ultimately found that male contestants were more sensitive to issue capability while making financial decisions. In a similar vein, Johnson and Gleason (2005) studied differences in betting patterns between men and women playing *Who Wants to be a Millionaire?*. They ultimately found that women were more likely to bet in early stages of the game, but played very cautiously in later rounds.

There have also been studies looking to understand bettor rationality in game shows. In Metrick's (1995) paper, he aimed to study high-stakes decision making by using data from *Jeopardy!*. He found that suboptimal decisions tended to come in patterns, which ultimately leads one to believe that contestants tend to make statistically rational decisions. He also found that mitigating factors could drive suboptimal choices. In particular, the market mechanism of Final Jeopardy caused inferior players to make a disproportional number of mistakes. Lindquist and Söderberg (2012) expanded this research by investigating a quirk that differentiates the American version of *Jeopardy!* from the Swedish version. Their results show that, as American *Jeopardy!* provides contestants with information regarding other contestants' scores, contestants tend to make very theoretically rational decisions in Final Jeopardy.

Simon's (2018) paper, which studies risk/loss aversion in *Jeopardy!* contestants, contains research most similar to my own. Much like the previous studies, Simon found that men and women do have some variation in betting patterns. Unsurprisingly, Simon found that score leaders had a significantly different betting pattern than did trailers. Simon also found that "expert" players, such as those who return for *Jeopardy!*'s "Tournament of Champions," show a different betting pattern than do ordinary contestants. Simon (2018) echoes many of the other studies in concluding that American *Jeopardy!* bettors display relative rationality, saying "despite the limited amount of time that players have to process the relevant information and to make their wagers—only three to five seconds in most cases—their ability to process this information and make quick decisions based upon it is quite remarkable" (p. 157).

DATA AND METHODOLOGY

Why Jeopardy!?

This study utilizes data from the American game show *Jeopardy!*, which provides a unique situation for studying the relationship between a person's income and their risk aversion. *Jeopardy!* includes three rounds in which three contestants must answer questions related to particular categories in order to score points. In the first two rounds, 18,000 and 36,000 points are available respectively, for a total of 54,000 points. For the majority of the game, contestants must choose questions within six categories that increase in difficulty and point value. In turn, most individual questions are fairly low stakes throughout the game. However, once during the first round and twice during the second round, a random question will become a Daily Double. In these cases, the contestant that happened upon the Daily Double must quickly wager an amount of their choosing to risk on the question, and unlike ordinary questions, other contestants cannot steal the question. This presents a natural experiment in which a single person's willingness to risk can be isolated with a relatively small number of outside variables. *Jeopardy!* begins by announcing each contestant's profession as well as the city and state in which they reside in. With this information, each contestant's annual income can reasonably be estimated. In turn, the relationship between a contestant's risk aversion and annual income can be studied.

The third and final round of *Jeopardy!*, appropriately named Final Jeopardy, presents the same scenario for all three contestants simultaneously. Therefore, it should be noted why Final Jeopardy data wasn't used in this study. Since Final Jeopardy occurs at the very end of the game, and contestants have full knowledge of their opponents' scores, the situation presents a very straightforward decision for contestants to navigate. Also, the betting rationale of Final Jeopardy is very skewed by the random category it is associated with, as contestants are made aware of the question subject before they make their respective bets. Essentially, the majority of the time a contestant stumbles upon a Double Jeopardy question by choosing a category they presumably feel confident in, which inherently allows some level of control over bettor expertise. On the other hand, bettors will theoretically bet disproportionately to their innate risk aversion during Final Jeopardy based on their knowledge of the randomly chosen subject.

Data Sources and Criteria

Data used in this study are based entirely on information within the space of *Jeopardy!* games played from January 2019 to October 2020. This range is fairly limited, as it became unreliable to properly estimate the annual incomes of earlier contestants given the methods used. Information was provided by the fan-run site *J-Archive*, which archives extensive information about every *Jeopardy!* game ever played (see Appendix A). Despite being officially unaffiliated with *Jeopardy!*, the site is commonly used by contestants to train for their appearance on the show, and Simon (2018) used it to confirm a contestant's appearance on the show. While this website was incredibly helpful, much of the data needed to pursue results had to be manually calculated in order to construct the dataset used.

This dataset consists of 344 Daily Double entries, including 204 unique contestants. These entries had to meet certain qualifications in order to be incorporated into the data set. Contestants who had more than one Daily Double decision during their time on the show were included up to a maximum of three times in the dataset and, in the case that a contestant had more than three applicable Daily Double decisions, the first three decisions were included. This is to prevent an oversaturation in the data of expert or experienced players, which were proven to display a different betting pattern than ordinary contestants (Simon, 2018). Entries in which a contestant bet more than 100% of their current pot, as well as entries in which contestants had a negative pot, were not included in order to mitigate variation in the results. Lastly, entries in which a contestant's annual income could not be properly estimated by the soon to be discussed methods, were not included in the dataset.

A number of variables were calculated in association with each Daily Double entry included in the dataset. Since most of these variables were manually calculated it's important to discuss the significance of each one. Contestant annual income was derived by using the contestants' occupation and the city/state they live in; this information is announced at the beginning of the show. Contestant annual income was estimated in large part by the utilization of the career salary tool on the job-searching website *Indeed*. This tool incorporates data from people in a particular occupation and area in order to estimate an average base-salary for a person who holds a given occupation in a given location (see Appendix B). In certain cases, data from the Bureau of Labor Statistics (2019) was utilized, rather than Indeed, to control for variance in the annual income of certain professions, such as primary/middle school teachers and college professors. This variable is denoted *EAI* in the tables, and is recorded in $10,000s. This allows us to track the change in contestant betting habits per $10,000 increases to annual income.

Bet%, which is used as one of the dependent variables in the regression analyses, is the percentage of a contestant's pot a contestant chooses to bet on the Daily Double question. This was calculated by dividing the amount bet over the contestant's pot prior to their answering the question. The dependent variable used in the other model, *Amount Bet*, is simply the exact amount bet by a given contestant in a Daily Double instance.

A given contestant's confidence is controlled for through an issue capability variable, similar to that found in He et. al's (2008) study. Unlike their study, which interprets this variable through the percentage of questions a contestant gets correct in a category prior to the Daily Double question, this study interprets the variable through a pure count of questions gotten correct prior to the Daily Double question. As is the case in Simon's (2018) paper, a contestant's position in the game as well as the stage of the game are taken into account. Generally speaking, since *Jeopardy!* uses dollars as the unit by which points are scored, these variables can be seen as being measured in dollars. A given contestant's position at the point at which the Daily Double occurs is of obvious importance to the interpretation of the bettor's decision; a contestant who is far behind may be more willing to take a larger risk. This variable is expressed by the contestant's position relative to first place. If the contestant is leading, how much are they ahead of second place by? If the contestant is trailing, how much are they trailing first place by? The stage of the game when the Daily Double occurs is also incredibly important; a contestant is far more likely to take irrational risks early in the game, when the stakes of their decision aren't as high. The stage of the game is interpreted through the variable

Potential Points Left, which denotes the sum total of points potentially available to the contestant after the Daily Double question is answered. For the purpose of this variable, in the event that there are more potential Daily Double questions available, the point values of these questions are treated as though they are regular questions. This is simply because contestants cannot know whether they are going to land upon the future Daily Doubles, so they are not likely to factor them into their strategy. Again, potential Final Jeopardy bets are not considered here since contestants cannot know how many points they will have to wager on Final Jeopardy.

This study includes a dummy variable equal to 1 when a contestant is male and equal to 0 when a contestant is female. While this study is not looking to study differences in betting patterns between men and women, He et. al (2018) as well as Johnson and Gleason (2005) show that men and women have some level of variation in betting patterns while competing in game shows. Table 1 includes summary statistics for each of the main variables included in this study.

Table 1: Summary Statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bet%	344	.516	.301	.011	1
Issue Cap	344	1.215	.864	0	4
Contestant Position	344	-333.549	5768.309	-18400	19300
Potential Points Left	344	26878.488	14893.394	0	52000
Male	344	.567	.496	0	1
Amount Bet	344	2706.16	1632.926	100	13000
EAI	344	7.825	3.793	1.956	26.906

Methods

In this study, four OLS regressions across two different equations were used to gather a complete picture of the data. As previously stated, the general model utilizes

Bet% as the dependent variable, *EAI* as the independent variable of measure, and the rest of the variables as control variables. The second model is almost identical to the first, except for the change in the dependent variable. In this model, the amount a contestant bets acts as the dependent variable. While this doesn't account for the contestants' current pot, it places higher priority on higher stakes bets. Basically, it is far easier to bet most or all of your pot when you only have a small number of points available.

In every regression, standard errors were clustered at the player level using a unique player ID. Primarily, this was done to control for unique, and especially irrational, betting patterns from individual contestants. This was also helpful in accounting for especially successful contestants whose Daily Double entries stretch past a single game they participated in. Many factors could alter the betting pattern and risk aversion of a contestant from day-to-day; most importantly, highly skilled contestants are likely to adjust their relative risk aversion based on the perceived skill level of their opponents.

Equation 1: General Equation

$$\text{Bet\%} = \beta_0 + \beta_1\text{EAI} + \beta_2\text{IssueCap} + \beta_3\text{ContestantPosition} + \beta_4\text{PotentialPointsLeft} + \beta_5\text{Male} + \epsilon$$

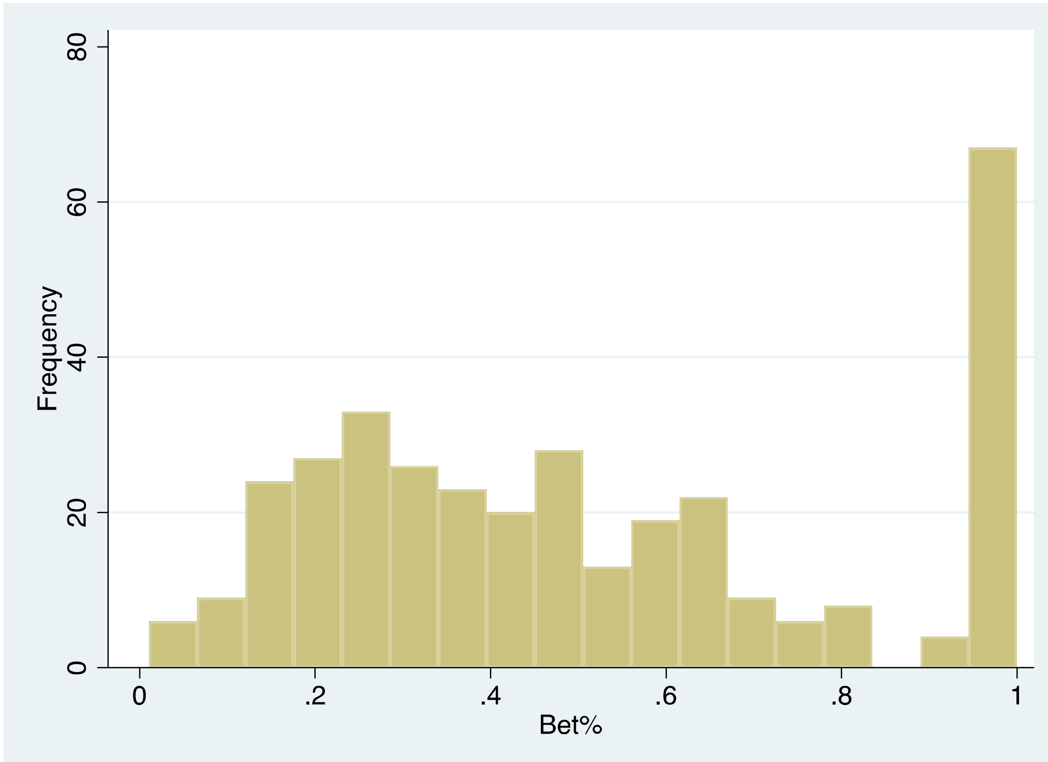
Equation 2: Secondary Equation

$$\text{Amount Bet} = \beta_0 + \beta_1\text{EAI} + \beta_2\text{IssueCap} + \beta_3\text{ContestantPosition} + \beta_4\text{PotentialPointsLeft} + \beta_5\text{Male} + \epsilon$$

In order to mitigate some quirks of the data, four OLS regressions will be run with each equation. The central regression will include the full dataset. Each of the other three regressions will effectively act as robustness checks across different parameters, that work by focusing on a specific section of the dataset. Summary statistics for the entries included in the respective robustness checks can be found in appendices C, D, and E.

The first robustness-check regression will look to control for a preponderance of low-risk all-in bets. While the mean of *Bet%* is just over 50% (.516), it is heavily inflated by a disproportional amount of all-in (100%) bets, as can be seen in Figure (1). Of course, not all all-in bets should be disregarded. Inevitably, there is a large amount of all-in bets simply based on how cognitively available an all-in bet is during a split second decision. A contestant low in risk aversion is far more likely to risk their entire pot than bet some arbitrary high percentage of their pot. However, it can be fairly assumed that most low-risk all-in bets occur in the first round, when there is adequate time for a contestant to catch up with their opponents if they miss the question. While it could also be reasonably assumed that contestants far behind in the second round may also perform this low-risk all-in bet, it must be remembered that the second-place contestant goes home with more than their third-place counterpart. Since most contestants will want to take more money home, this theory is rendered unlikely. With all this having been said, in this regression 33 entries where a contestant bets their entire pot in the first round are eliminated from the dataset.

Figure 1: Frequency Distribution of *Bet%*

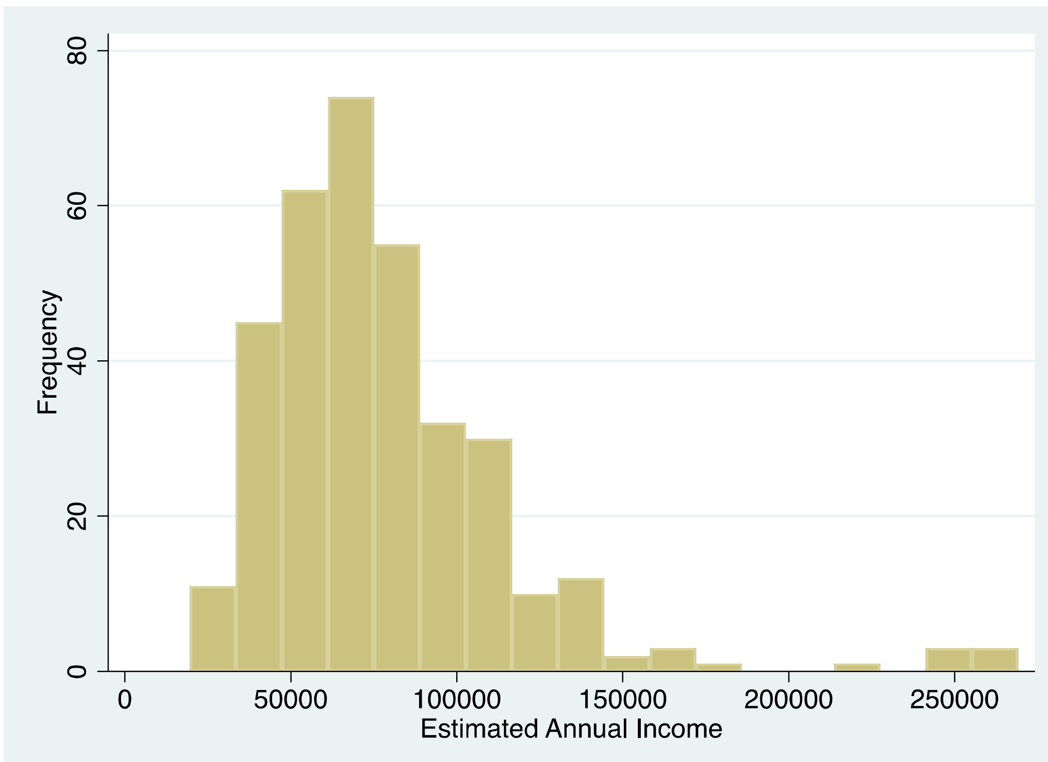


The second robustness-check regression will look to eliminate outliers on the upper side of the *Estimated Annual Income* variable. As one can tell from the summary statistics available in Table (1), estimated annual income is very top-heavy, with a maximum value over 5 standard deviations from the mean. Alternatively, the minimum value is less than two standard deviations from the mean. These examples are not singular, as the full frequency distribution graph is clearly right-skewed. Using basic interquartile analysis, this regression will use no entries that act as outliers within this variable. There are no outliers on the lower end of the spectrum, so this will only apply to entries associated with contestants who make more than an estimated $151,093.38 annually (15.109338 in $10,000s). 13 outliers are eliminated in this regression, which is relevant for a dataset of this size. To eliminate confusion, the calculations and the figure below are respectively conducted and displayed using regular dollars (rather than $10,000s).

$$1.5(92{,}545 - 53{,}512.75) = 58{,}548.38$$

$$92{,}545 + 58{,}548.38 = 151{,}093.38$$

Figure 2: Frequency Distribution of Estimated Annual Incomes



The final robustness-check regression will look to isolate instances in which a contestant has to make a competitive bet. Particularly this regression will only include entries in the dataset which a contestant is within 4,000 points from first place (if they are trailing) or second place (if they are leading). Regressions including entries solely from contestants more than 4,000 points ahead as well as a regression including entries solely from contestants more than 4,000 points behind (see appendices F and G).

RESULTS

As seen below, Table (2) shows the connected results of the main regression for both equations. Column 1 denotes the results for Equation (1), which utilizes *Bet%* as the dependent variable. Column 2 then denotes the results for Equation (2), which utilizes *Amount Bet* as the dependent variable.

Table 2: General Model

	(1) Bet%	(2) Amount Bet
EAI	.00057	7.28475
	(.00271)	(21.69412)
Issue Cap	-.02405*	-69.13284
	(.01435)	(82.73262)
Contestant Position	-.00002***	-.01997
	(0)	(.01885)
Potential Points Left	.00001***	-.04267***
	(0)	(.00523)
Male	.11498***	674.99672***
	(.02834)	(172.29234)
Constant	.21048***	3490.8383***
	(.04568)	(289.51646)
Observations	344	344
R-squared	.44905	.20759

Robust Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Note: This includes regression results for both equations, with the numbers above the dependent variables indicating which corresponding equation the results are referring to.

Most notably, both Equation (1) and Equation (2) show that a contestant's estimated annual income is insignificant in correlation with the respective dependent variables. This would seem to fall in line with my previously stated hypotheses. Although *Estimated Annual Income* is insignificant in both equations, it is confidently positive, which I did not predict. Otherwise, the independent variables in Equation (1) seem to do a fairly good job of explaining the dependent variable, given the incredible amount of unexplainable outside variables present in a scenario like this. All control variables were statistically significant, and three of the four were significant at a 99% confidence level. *Contestant Position* being negative tends to make sense; the further ahead you are, the less likely you are to wager. Likewise, *Potential Points Left* having a positive coefficient makes intuitive sense; the earlier in the game it is, the more likely one is to wager a larger percentage of their pot. Interestingly, the *Male* dummy variable is positive, which corroborates the idea presented by He et. al (2008) as well as Johnson and Gleason (2005) that men have a tendency to bet more aggressively in game shows. Perhaps the most confusing result in Equation (1) is that the *Issue Cap* variable has a negative coefficient. One would think that a contestant more capable in a category would be likely to bet more on the corresponding Daily Double. Perhaps this coefficient again gets at the logic associated with the *Contestant Position* variable. Contestants who do especially well in a category are more likely to be leading, which in turn makes them less likely to wager as to protect their lead. A correlation matrix between *Contestant Position* and *Issue Cap* (see Appendix H) confirms a positive correlation between the two but does not suggest any evidence of multicollinearity. These variables were far less reliable in explaining the pure amount a contestant bets in Equation (2), which isn't particularly surprising. Both *Contestant Position* and *Issue Cap* become insignificant, as the amount bet doesn't have a lot to do with how a contestant is doing relative to their opponents. Unsurprisingly, *Potential Points Left* stays significant, but its coefficient turns negative, which indicates that contestants tend to bet less early in the game (when they have less to bet). Again, the *Male* dummy variable stays strongly positive and significant.

Table 3: Early Game All-In Robustness Check

	(1) Bet	(2) Amount Bet
EAI	.00213	5.21728
	(.00267)	(23.11667)
Issue Cap	-.03066**	-78.02607
	(.01326)	(93.66448)
Contestant Position	-.00002***	-.02167
	(0)	(.01891)
Potential Points Left	.00001***	-.04291***
	(0)	(.00579)
Male	.10855***	725.67374***
	(.02715)	(187.10373)
Constant	.26202***	3490.3222***
	(.04374)	(305.09613)
Observations	311	311
R-squared	.40335	.197

Robust Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Note: Entries are excluded where $x = 1$ for the *Bet%* variable (indicating an all-in bet) and $x > 36{,}000$ for the *Potential Points Left* variable (indicating that the game is still in the first round).

While not too much ultimately changes as a result of this robustness check, Equation (1) seems to be far more sensitive to it. The *Estimated Annual Income* variable, while still not significant, did gain in significance considerably, which suggests that there may be a stronger correlation between risk aversion and income later in the game. Aside from *Issue Cap* receiving a considerable gain in significance, the variable changes are fairly uninteresting for both equations. I was a little surprised at just how much the R-square dropped in Equation (1) just from the removal of these 33 variables. This may echo the fact that there is a lot of unexplainable variation in a model like this.

Table 4: Outlier Robustness Check

	(1) Bet	(2) Amount Bet
EAI	.00358	-34.98189
	(.00532)	(30.37985)
Issue Cap	-.02321	-47.93383
	(.01452)	(84.56442)
Contestant Position	-.00002***	-.01813
	(0)	(.01922)
Potential Points Left	.00001***	-.04047***
	(0)	(.00506)
Male	.10695***	717.82018***
	(.02889)	(172.88852)
Constant	.18325***	3678.92***
	(.05318)	(334.13661)
Observations	331	331
R-squared	.46193	.20344

Robust Standard errors are in parentheses
**** p<.01, ** p<.05, * p<.1*

Note: Excluded outliers were determined with basic interquartile analysis.

Again, this robustness check did not turn the *Estimated Annual Income* variable significant for either equation. Both equations were fairly sensitive to this robustness check. In Equation (1), there is a sharp increase in the R-Squared relative to the number of observations removed. This also turns the *Issue Cap* variable insignificant. In Equation (2), the *Estimated Annual Income* variable was incredibly sensitive to this robustness check, despite not turning significant. Perhaps with a larger dataset, this variable could turn significant.

Table 5: Competitive Decision Robustness Check

	(1)	(2)
	Bet	Amount Bet
EAI	.0003	14.7065
	(.00443)	(22.36533)
Issue Cap	-.02067	-41.53971
	(.01875)	(89.90803)
Contestant Position	-.00003***	.02794
	(.00001)	(.05107)
Potential Points Left	.00001***	-.0318***
	(0)	(.00689)
Male	.1121***	557.6593***
	(.0349)	(183.50664)
Constant	.10264*	2902.8562***
	(.05922)	(384.56374)
Observations	216	216
R-squared	.42572	.15533

Robust Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Note: These results include entries where $-4{,}000<x<4{,}000$ for the *Contestant Position* variable.

Again, the equations did seem to be fairly sensitive to this robustness check. However, like the other regressions, this one does not result in the *Estimated Annual Income* variable becoming significant. On the contrary, in Equation (1), this variable drops in significance. Both equations' R-squared go down considerably, which is not particularly surprising given the number of entries deleted.

DISCUSSION

This research concludes that, within the context of *Jeopardy!*, although there is a positive correlation between someone's estimated annual income and risk aversion, this correlation is not significant. Of course, this is not to say that these results can be unquestionably extrapolated into a real-world application. There are many factors present in a game show that may cause a contestant to wager at odds with their typical level of risk-aversion. Contestants participating in a game show like *Jeopardy!* are also not completely representative of the average person; it can be safely assumed that *Jeopardy!* contestants have higher than average IQs regardless of their profession. Many real-world financial decisions are more thought out than the split-second decisions made on *Jeopardy!*, despite contestants' impressive rationality. Still, these results are an interesting look into what is an impossible question to answer perfectly.

It is unclear whether a larger sample would alter the results of this study, but it would certainly provide a more complete understanding of the situation. This study utilized a fairly small sample for reasons that would not apply to any future research. First, due to time constraints, the estimated annual income data was calculated asynchronously with respect to contestants' appearances on the show. Of course, the ebbs and flows of demand with respect to occupations make it such that one's estimated annual income changes with time. With this said, it was important to not reach too far back for data in order to maintain consistency across time in the estimated annual income variable. This need was compounded by the COVID-19 pandemic, which resulted in great changes in the demand of many occupations. This is all to say that a study with a larger sample, in which estimated annual income is calculated synchronously with the show, could make for an interesting expansion of the research.

Additionally, using the methodology of this research in conjuncture with research on bettor rationality could expand the research considerably. One of the greatest challenges of this research was in deciding the basis of which entries to include in order to best represent the average person. Narrowing that down by eliminating decisions that do not represent the mean would be a great step in the right direction.

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APPENDIX A: J-ARCHIVE SCREENSHOT

Figure 3: J-Archive Screenshot

J! ARCHIVE [current season] [last season] [all seasons] [prizes] [wagering calculator] [help] Search

Scores for show #8106 - Monday, December 2, 2019

Contestants

[<< previous game]

Mohammed Ali, a physician from Bear, Delaware
Joanna LeRoy, an attorney from Boston, Massachusetts
Alex Damisch, a data scientist from Chicago, Illinois (whose 2-day cash winnings total $26,200)

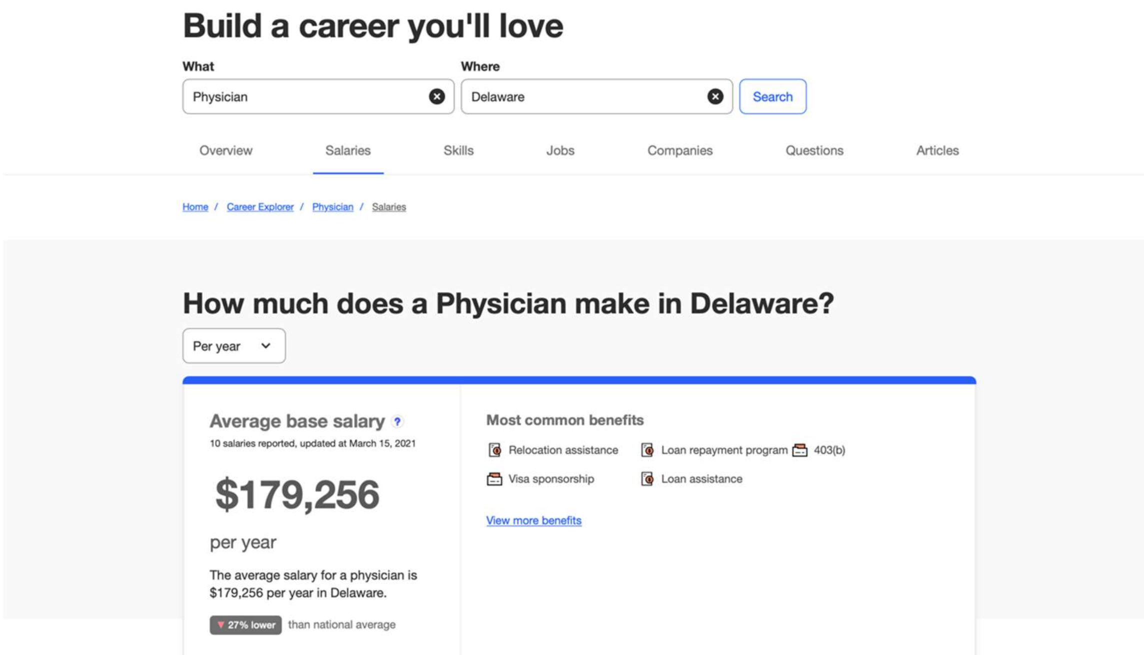
[next game >>]

Jeopardy! Round

	Alex	Joanna	Mohammed	
1	$0	$600	$0	1
2	$0	$1,600	$0	2
3	$0	$2,400	$0	3
4	$0	$3,000	$0	4
5	$0	$3,400	$0	5
6	$0	$3,400	$200	6
7	$1,000	$3,400	$200	7
8	$1,000	$3,400	$1,000	8
9	$1,000	$3,800	$1,000	9
10	$1,000	$3,800	$2,000	10
11	$1,000	$3,800	$1,000	11
12	$1,000	$3,800	$1,000	12
13	$1,800	$3,800	$1,000	13
14	$1,800	$3,800	$1,000	14
15	$1,800	$3,800	$1,000	15
16	$1,800	$3,800	$1,600	16
17	$1,800	$4,200	$1,600	17
18	$1,800	$4,400	$1,600	18
19	$2,600	$4,400	$1,600	19
20	$3,600	$4,400	$1,600	20

APPENDIX B: INDEED CAREER BUILDER SCREENSHOT

Figure 4: Indeed Career Builder Screenshot



APPENDIX C: EARLY GAME ALL-IN ROBUSTNESS CHECK SUMMARY STATISTICS

Table 6: Early Game All-In Robustness Check Summary Statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bet	311	.465	.27	.011	1
Issue Cap	311	1.225	.843	0	4
Contestant Position	311	-291.772	6043.245	-18400	19300
Potential Points Left	311	24835.37	14169.532	0	52000
Male	311	.559	.497	0	1
Amount Bet	311	2782.376	1679.712	100	13000
EAI	311	7.845	3.9	1.956	26.906

Note: This table includes descriptive statistics corresponding to the entries included in the "Early Game All-in Robustness Check."

APPENDIX D: OUTLIER ROBUSTNESS CHECK SUMMARY STATISTICS

Table 7: Outlier Robustness Check Summary Statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bet	331	.517	.301	.011	1
Issue Cap	331	1.224	.869	0	4
Contestant Position	331	-384.414	5803.542	-18400	19300
Potential Points Left	331	26818.127	14883.13	0	52000
Male	331	.565	.497	0	1
EAI	331	7.304	2.632	1.956	14.104

Note: This table includes descriptive statistics corresponding to the entries included in the "Outlier Robustness Check."

APPENDIX E: COMPETITIVE DECISION ROBUSTNESS CHECK SUMMARY STATISTICS

Table 8: Competitive Decision Robustness Check Summary Statistics

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Bet	216	.533	.301	.023	1
Issue Cap	216	1.227	.862	0	4
Contestant Position	216	-320.824	2164.11	-4000	4000
Potential Points Left	216	31812.963	14869.536	0	52000
Male	216	.532	.5	0	1
Amount Bet	216	2243.931	1387.62	100	13000
EAI	216	7.872	3.517	2.573	26.906

Note: This table includes descriptive statistics corresponding to entries included in the "Competitive Decision Robustness Check."

APPENDIX F: NON-COMPETITIVE DECISION ROBUSTNESS CHECK (LEADING CONTESTANTS)

Table 9: Non-Competitive Decision Robustness Check (Leading Contestants)

	(1) Bet	(2) Amount Bet
EAI	.00188	6.93846
	(.00329)	(36.69748)
Issue Cap	-.02006	-217.20918
	(.01947)	(198.8005)
Contestant Position	-.00001	-.05262
	(.00001)	(.06034)
Potential Points Left	0**	-.00918
	(0)	(.02335)
Male	.10218**	827.74006*
	(.03971)	(443.95512)
Constant	.22641**	3627.851***
	(.10006)	(1040.1915)
Observations	66	66
R-squared	.2513	.08319

Robust Standard errors are in parentheses

*** $p<.01$, ** $p<.05$, * $p<.1$

Note: This regression includes entries only where x>4,000 for the *Contestant Position* variable. Therefore, this regression includes entries in which leading contestants were likely making less competitive decisions.

APPENDIX G: NON-COMPETITIVE DECISION ROBUSTNESS CHECK (TRAILING CONTESTANTS)

Table 10: Non-Competitive Decision Robustness Check (Trailing Contestants)

	(1) Bet	(2) Amount Bet
EAI	-.00259	-.29711
	(.00441)	(57.8528)
Issue Cap	-.02449	132.51568
	(.03423)	(220.30581)
Contestant Position	-.00002**	-.06837
	(.00001)	(.08214)
Potential Points Left	.00001***	-.04999***
	(0)	(.01672)
Male	.10243*	611.91322
	(.06094)	(391.44129)
Constant	.33017**	3512.2985***
	(.12935)	(946.36238)
Observations	69	69
R-squared	.25459	.17269

Standard errors are in parentheses

**** p<.01, ** p<.05, * p<.1*

Note: This regression includes entries only where x<-4,000 for the *Contestant Position* variable. Therefore, this regression includes entries in which trailing contestants were likely making less competitive decisions.

APPENDIX H: CORRELATION MATRIX BETWEEN ISSUE CAP AND CONTESTANT POSITION

Table 11: Correlation Matrix Between Issue Cap and Contestant Position

Matrix of correlations

Variables	(1)	(2)
(1) Issue Cap	1.000	
(2) Contestant Position	0.217	1.000