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# Exploring the Learning Outcome of a Financial Literacy Game

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## Abstract:

The financial literacy game was part of a financial literacy intervention that was conducted in Karnataka, India. Rural women participated in playing the game for four weeks. Using a fixed effects model at the subject level, the game was measured by three outcomes. These outcomes consist of the rate of type one errors, type two errors and the rate of going bankrupt that could occur for players when playing the financial literacy game. With type one errors, we find that adding one more unit on the return on investment (roi) would lead to about a 1.59 percent decrease in type one errors to occur in the financial literacy game. When the return on investment increases for players, this decreases the rate of type one errors that players will receive when playing the game. During week four, we can expect about 12.29 percent of type two errors to occur in the game. As the weeks progress, women are missing out on buying good animals that can give them a positive income. Players that play the financial literacy game in week four are 15.67 percent less likely to experience going bankrupt. As the weeks progress, women learn to stay away from going bankrupt when playing the financial literacy game.

## **1. Introduction**

Having a basic level of financial literacy allows for a person to make decisions on their personal finances. The term financial literacy can be defined as a person's ability to understand financial concepts and being able to plan their own finances. Regarding surveys from the past, it is not common among people to have a basic level of financial literacy. One survey shows that 24 percent of adults in India had adequate knowledge on financial concepts (Klapper, Lusardi, & Oudheusden, 2015). Providing financial education in an effective way for people to receive at different institutions would be an important building block for people to gain financial knowledge and to help boost their financial confidence.

The financial literacy intervention was conducted in Karnataka, India during the summer of 2023. The financial literacy intervention was split up into three treatment groups and one control group. The treatment groups consist of an aspiration group, a game group and an interaction group, which is the aspiration and game combined in one group. For the purpose of this paper, we will look at the outcome of players that play the financial literacy game. The outcome that we will look at is the rate of type one errors, type two errors and the rate of going bankrupt that may occur for players that play the financial literacy game. With the financial literacy game, we will look at the results to help us get a better understanding of whether the game was effective for the players. The research question that I will look into is: Does the financial literacy game provide a learning outcome for women in India? With the players playing the financial literacy game for four weeks, we hope to see the proportion of type one errors and type two errors go down during week four.

The paper will proceed as follows. Section two will consist of literature on financial literacy as well as studies on how digital games can help people facilitate their learning while having an enjoyable experience when playing math games on tablets. The other portion that will be included in section two is the method portion, for which the fixed effects model will be used to help measure the different outcomes that occur in the financial literacy game. The third section will be the results, which includes the proportion of type one errors, type two errors and the proportion of going bankrupt that players may experience when playing the financial literacy game. The final section will consist of the summary and conclusion.

## **2. Literature and Method**

### 2.1 Literature

The lack of confidence that women may have is not helpful when it comes to making financial decisions. Lots of women take a step back from larger financial decisions and leave it to a family member, like their spouse or father (Singh and Kumar, 2017). Although women in India are good at budgeting and managing household expenses, Singh and Kumar (2017) believe that it is important for every woman to have a minimum basic level of financial literacy, since this allows for them to make their own decisions. Regarding Arora's (2016) study, people that are from rural areas are lacking in financial knowledge compared to the women that are from cities. With her sample of people, 10 percent of women that live in villages have a high financial knowledge and they consist of teachers or those that received their education from cities (Arora, 2016). From the survey, the results indicate that the general awareness of financial planning tools among women is considered as poor. Having a low awareness of financial planning tools can be concerning for women that cannot plan out for their future, especially when managing their personal finances.

Arora's (2016) study looks at the assessment of financial literacy among working Indian women. Regarding the middle income group, respondents have more financial positive behavior compared to the women that are in the lower and higher income group. The ability for women in the middle income group to be disciplined and have awareness of their finances can be a good indicator that shows that they are not buying items from an emotional standpoint. Singh and Kumar (2017) points out that some women have a lack of financial knowledge, since this comes from not being able to afford to receive a financial education from an institution. With less access to financial education and not being able to use computers frequently, these are some of the physical barriers that women are dealt with. The lack of education and resources that are not available to women can reduce their ability to understand how to budget their money properly and it can take away the ability for women to make good financial decisions for the short and long term.

There are 3 important fundamental concepts that Lusardi (2019) takes into account when looking at financial decision making. One of these fundamental concepts are interest rate calculations and this question was provided to people to test their understanding of interest compounding. Other questions that are considered in financial decision making involve the understanding of inflation and risk diversification. In the United States, less than 30 percent of respondents are able to answer the big three questions correctly by age 40, while Switzerland had 45 percent of respondents that are 35 years old or younger that could answer the big three questions correctly (Lusardi, 2019). From different parts of the world, people may experience having low levels of financial literacy. Financial literacy is considered to be low for women in India, while people in the United States and Switzerland could experience having low levels of financial literacy. With Lusardi's (2019) evaluation on peoples' financial decision making based

on the 3 fundamental concepts, this provides importance on helping her understand the areas that people can be educated about, such as concepts related to interest compounding and risk diversification.

There has been a set of tools that were designed to evaluate a web-based educational program that is targeted at explaining the concept of risk diversification (Lusardi et al., 2017). The different educational programs that were provided to the participants were an informational brochure, an interactive visual tool, a video narrative and a written narrative. The design of the different educational programs is to help improve the participants' knowledge of risk diversification but is different from previous financial education programs that have been evaluated in academic work, due to the innovative ways of the information being provided to the people (Lusardi et al., 2017). Heinberg et al. (2014) had two formats to compare for the educational programs. Lusardi and coauthors were able to expand on the analysis of Heinberg et al. (2014) by carrying out four formats to help provide a low-cost financial education online (Lusardi et al., 2017). With their intervention, they were able to help improve the participants' financial literacy, specifically on risk literacy. For the videos that were provided in the educational program, this was helpful in educating the participants on risk diversification.

Lusardi and Tufano were able to design a set of questions to assess peoples' understanding with regards to debt. Lusardi and Tufano (2015) defines debt literacy as the ability to make simple decisions with regards to debt. From their results, they find that low levels of debt literacy are spread across the United States population. People with low levels of debt literacy consist of women, the elderly and those that are divorced or separated. Regarding their survey, participants were provided a question to respond about their comfort of handling their current debt level. Connecting the survey with debt literacy, they find that low debt literacy is

correlated with self-assessed overindebtedness (Lusardi and Tufano, 2015). Regarding the literature on financial literacy, concepts like savings, investment and computing interest rates are some common things to come across in academic work. Prior to Lusardi and Tufano's work on financial literacy, debt literacy was not really a concept that was frequently mentioned. With Lusardi and Tufano's work, they were able to point out that people could experience low levels of debt literacy and their work on debt literacy was able to bring awareness, while providing attention on the importance of having a basic understanding of debt literacy.

Bhutoria and Vignoles (2018) study assess the impact of a rule of thumb (RoT) intervention that focuses on personal savings of women that have committed to be part of a self-help group. The goal for women that have joined a self-help group is to help improve their financial situation. With their study, they use a clustered randomized controlled trial methodology to assess the impact of the RoT financial education program (Bhutoria and Vignoles, 2018). Regarding Bhutoria and Vignoles (2018) study, they were able to contribute to the design of educational interventions among poor populations in developing countries. Having the rule of thumb financial education program take part in their study was helpful in pointing out the knowledge gaps that acted as potential barriers to savings. With the financial education program being effective in providing an increase in total savings on average by 7 percent for the duration of three months, their intervention was successful in providing women help to improve their personal savings.

Hamari and co-authors (2016) study the effects of engagement and immersion on learning from game-based learning environments. Regarding their study, they look at the relationship of such variables like challenges, engagement and immersion and analyze this to the degree to which those variables help predict learning (Hamari et al., 2016). With the

challenge-skill dynamic, this has been found in increasing motivation while extending the players' capacities (Fullagar, Knight, & Sovern, 2013). The national studies have continuously found that the lack of challenge is commonly a reason for disengagement. Prior to Hamari and coauthors' study, there was little research with regards to having applied structural research models on variables surrounding engagement and immersion to help look at their interdependencies and pathways towards predicting learning. Regarding their study, they want to figure out whether an increase in challenge, skill, engagement and immersion within a game or gamified experience will provide a beneficial effect on learning. An important finding from the study includes challenge and engagement having a positive effect on perceived learning. From their study, it indicates that educational video games may effectively engage students in a situation like a learning activity. With activities that are offered in the players' Zone of Proximal Development, this provides a challenge to learners within the range that is appropriate to their skill level (Hamari et al., 2016). Their findings tell us that game designers should pay attention to challenge and engagement while counting for players' skills.

Cai and Song (2017) use a randomized experimental design to study two factors that could impact insurance adoption, which is personal experience with disaster and the knowledge of the payout probability. As for their study, they use two different disaster probabilities in the game treatment to analyze the insurance adoption behavior when the probability is similar to or higher than the real disaster probability of 10 percent (Cai and Song, 2017). Regarding the weather insurance adoption, the results suggest that the game treatment and the calculation treatment was effective in the increase of the actual take-up. With their study, they were able to show that offering information with regards to the true expected returns of a financial product affects adoption decisions (Cai and Song, 2017). With similar interventions, they can be used on



an extensive level to help influence the adoption of different financial products that would deal with uncertainty (Cai and Song, 2017). To inform farmers on the real likelihood of disasters would allow them to learn to estimate a product value, which would allow them to make more informed purchase decisions. Cai and Song's findings was able to prove that providing information on the real expected values for financial assets may be significant in providing improvement on the effectiveness of people that receive a financial education.

In the past years, there have been more teachers that have combined educational computer games towards training and teaching (Furio et al. 2013). The reason behind this is due to teachers that saw well-designed educational computer games as an effective way to help students construct knowledge (Wang and Chen, 2010). With regards to their study, they want to test the ability of two types of tablet PC-based games, which consists of challenging games and matching games (Hung et al., 2015). Testing the ability of challenging and matching games would be a way of facilitating students' performance and flow experience. Tablet PCs can be used in an educational setting to help facilitate students' learning.

Their study consists of a mathematics game that is designed for young students, which is used to conduct tablet PC game-based learning activities (Hung et al., 2015). From the pilot study, levels one to six were considered as matching games and levels 7 to 14 were considered as challenging games. For the data analysis, the analysis of covariance (ANCOVA) was used to help look at the effects of learning achievement on the control and experimental groups (Hung et al., 2015). Students that were part of the challenging game environment had a significantly better recognition from the benefit that was provided by the game of Motion Math: Hungry Fish. The challenging game that was part of the learning activities were difficult to complete while easy to understand, which provides a combination that could be effective towards learning (Hung et al.,

2015). With their results, it is consistent with the results of a previous study that shows that game-based learning is an effective tool to create learning motivation as well as satisfaction (Kebritchi & Hirumi, 2008). Students that participated in playing the challenging game showed high levels of motivation to finish their goal-driven tasks. With their study, their contribution comes from using conventional game-based methods for mathematical training, but is combined with the table PC-based instruction to help create an effective, innovative and enjoyable experience for students to learn from playing the mathematics game.

A digital mathematics game was created to play on tablets to test if this was another option for students to learn mathematics. To assess the effectiveness of their study, an activity was provided to an elementary school mathematics course to look at the learning achievements and learning motivations that occurred for the students (Hung et al., 2014). In these activities, there would be games that would be provided for students, specifically games that were related to line symmetry figures. One game that students may have been provided to play was being able to identify the two same figures from the three figures that were provided. Due to the experimental group having a higher learning motivation compared to the control group, their study finds that the game-based learning approach may be better in increasing the motivation for students to learn mathematics (Hung et al., 2014). With the digital mathematical games being played by students, they found that students were more interested to learn mathematics in a game-based learning environment compared to a traditional instruction. Presenting mathematics in a digital game context allowed for students to understand mathematics in an easy manner and playing the mathematics game on a tablet allowed for students to take notes on certain things that they did not have a good understanding of.

## 2.2 Method

The women that participated in the financial literacy game in Karnataka, India managed to play the game for four weeks. Considering a fixed effects model at the subject level, there are three outcomes to consider in measuring the financial literacy game. One outcome is buying an animal with a return of a negative income, which is referred to as a type one error. The next outcome to consider is players that pass on the opportunity to purchase a good animal, which is referred to as a type two error. For the situation of type two errors, this will be looked at by the first 15 plays or decisions that players make when playing the financial literacy game. The last outcome we want to look at is the rate of bankruptcies that occur for players when playing the financial literacy game. For the rate of bankruptcies that occur for players, this will be evaluated for players that lose a level in the financial literacy game.

$$Y_i = \alpha + \beta x_i + \gamma_2 + \gamma_3 + \gamma_4 + \epsilon_i$$

For a fixed effects model at the subject level, the explanatory variable will represent the return on investment from animals. Players that earn a positive income from buying an animal are expected to have a positive return on investment. Players that earn a negative income from buying an animal are expected to have a negative return on investment. The dummy variables that are included in the fixed effects model will represent the different weeks of the financial literacy game. The weeks that are included in the fixed effects model are week two, week three and week four. To prevent multicollinearity from being present, we will not include week one in the fixed effects model. As for the outcomes on the type one errors, type two errors and going bankrupt in the game, the purpose of including the different weeks in the fixed effects model is

to help us understand whether the rates of those outcomes increased or decreased from weeks two to four.

### **3. Results**

For figure 1, we take the mean of type 1 errors on all players for each play in the financial literacy game. As players manage to make over 150 plays in a game, we see that the proportion of type one errors do not go down. When players make around 150 plays or above in the financial literacy game, this could tell us that some players are reaching higher levels in the game. Although the rate of buying bad animals increases when players make over 130 plays, the proportion of type 1 errors does not increase at a significant rate. The financial literacy game does tend to get more difficult to play, especially when players get the chance to play between levels four to six. Taking this into consideration, this shows us that players are capable of learning from playing the game, since players are able to make progress in the financial literacy game while understanding to not continuously purchase bad animals that would provide them with a return of a negative income.

For figure 2, we take the mean of type 2 errors on all players for each play in the financial literacy game. Regarding the outcome of type two errors, we will consider the first 15 plays that type two errors may occur in the financial literacy game. When players start from play zero to making 100 plays, we find that the proportion of type two errors is increasing at a slow rate. With a rise of type two errors that is expected to occur, players are passing on the opportunity of buying good animals. It's interesting to see that the rate of type 2 errors is more likely to occur in the early levels of the financial literacy game. Since the beginning levels of the financial literacy game are less difficult to play, you would think that players would make the right decisions to

buy animals that would provide them back with cash. With the increasing rate of type 2 errors happening in levels one and two of the financial literacy game, this implies that some players are being passive in buying good animals. These situations are not good for players because passing on the opportunity of buying animals would mean that players would need to make more decisions to be able to receive a positive income and allow for them to complete the earlier levels in the financial literacy game.

The proportion of type two errors does start to decline when players generate over 100 plays when playing the game. When players get a chance to reach level four and the higher levels of the financial literacy game, the game can get more difficult for them to win those levels. It is not surprising that the proportion of type two errors does decline, since players would want to take the chance of buying good animals that could put them in a better position to complete and win a certain level. Players cannot afford to regularly pass on buying animals that would provide a return of a positive income, especially in the higher levels of the financial literacy game. By committing type two errors in the later levels of the game, players would not be able to give themselves a chance to even earn cash from animals and this would hurt their chances of completing a higher level in the financial literacy game.

For figure 3, we take the mean of going bankrupt on all players for each play in the financial literacy game. When considering all players that played the game, we see that the lowest line on the proportion of going bankrupt is increasing when players are able to make over 100 plays in the financial literacy game. The life expectancy of certain animals may not live through the whole period of what was promised to players that decided to purchase those animals. When certain animals do not live through the whole period, this takes away the expected positive income that players could have earned in the short term. The average rate of

going bankrupt can increase, since it is possible that players could have taken the chance to purchase animals that could have provided back a positive income, but instead got the worse end of the deal and ended up being in a terrible situation that could have led them to going bankrupt in the financial literacy game. However, we must consider that not every player was able to advance in the higher levels of the financial literacy game. Since not all players were able to generate 150 plays in the game, the average rate of going bankrupt in the later levels of the financial literacy game does not truly represent the players that were able to advance in the higher levels in the game.

Regarding figure 4, we take the mean of type 1 errors on players that were able to make 100 plays in the financial literacy game. From play zero to play one hundred, the rate of type one errors that occur does increase as players make more decisions in the financial literacy game. We see that the lowest line of type one error does fluctuate as players continue to generate more plays in the game. Regarding players that were able to make 100 plays in the game, the proportion of type one errors is not significantly increasing at a high rate. This is a good sign because players are not constantly making the same mistake of purchasing an animal that provides a return of a negative income. When players are able to avoid purchasing bad animals, this indicates that they are learning to stay away from committing type one errors and that they have a better judgment of what animals they should consider buying in the financial literacy game.

Regarding figure 5, we take the mean of type 2 errors on players that were able to make 100 plays in the financial literacy game. From plays 50 and above, the proportion of type 2 errors is increasing. When players are able to generate more plays in the financial literacy game, they may consider borrowing a loan to help them purchase animals. When players borrow loans, they

may not have the ability to purchase animals in the short term. The reason behind this is players need to wait for the animal that was purchased to provide an income that can help cover the loan and possibly gain a positive income that can be used to purchase animals later on in the financial literacy game. In the financial literacy game, players are provided the life expectancy of animals and it is important for them to consider the periods that the animals will live for. When players decide to purchase animals right after they had borrowed a loan in the previous play, this can put them in a bad position of losing a level in the game, since they are not providing enough time for the animal to return a positive income that would cover the loan and possibly earn extra cash that would be used later on in the financial literacy game.

For figure 6, we take the mean of going bankrupt on players that were able to make 100 plays in the financial literacy game. The proportion of going bankrupt continues to decline when players continue to play the financial literacy game. When players manage to generate around 70 plays and above, the average rate of going bankrupt is less than 5 percent. Since the average rate of going bankrupt is decreasing for each play, this indicates that players do not always put themselves in a position to not complete a certain level in the game. With the majority of the players avoiding going bankrupt as they generate more plays in the financial literacy game, this tells us that players are learning to stay away from bankruptcy as they continue to make progress in the game. Most players have a good understanding of passing on animals that would provide a return of a negative income. With players being able to stay away from going bankrupt in the game, this provides them a better chance of completing multiple levels in the financial literacy game.

For table 1, we carry out different fixed effects models to measure the rate of type one errors that occur in the financial literacy game. When measuring the rate of type one errors, the

return on investment (roi) across these results when estimated is relatively similar to one another. Adding one more unit on the return on investment would lead to about a 1.59 percent decrease in the rate of type one errors to occur in the financial literacy game. As the return on investment increases for players, this would decrease the rate of type one errors that players will receive when playing the financial literacy game. Players that are able to consistently get a return of a positive income from buying good animals will give themselves a better chance of winning a level and continue to progress in the financial literacy game.

When comparing the coefficients between week 2 to week 4, we can expect players to make more type one errors in week four. As players reach levels four and above, players can expect the game to be more difficult to play. When players advance to higher levels in the financial literacy game, it is possible for players to take the chance of buying animals that they would hope to receive a return of a positive income. Sometimes, players may experience getting the bad end of the animals that were bought, due to the animal's life expectancy being cut short of what it was supposed to be promised to last for when players had purchased the animals. Due to the financial literacy game being more difficult to play as players continue to progress in the game, it is not surprising for players to commit some type one errors in the later levels of the game. Since the rate of type one errors is not significantly high in week four, players have a good understanding of passing on animals that would give them a return of a negative income.

For table 2, we carry out some fixed effects models to measure the rate of type two errors that occur in the financial literacy game. When measuring the rate of type two errors, we find that the return on investment (roi) is statistically significant at the 1 percent level. Adding one more unit to the return on investment would lead to about a 2 percent increase in type two errors that occur. As players progress in the financial literacy game, we can expect the rate of type two



errors to occur more in the game for weeks three and four. Ideally, it would be better for players to commit less type two errors, especially when they advance to the higher levels in the financial literacy game. However, it could be necessary for players to pass on purchasing animals for a few plays if they decide to borrow a loan and use it to purchase an animal.

When looking at the coefficient for week three, we find that it is statistically significant at the one percent level. Regarding the coefficient for week four, it is statistically significant at the five percent level. With a higher rate of type two errors occurring in weeks three and four, this tells us that more players are passing on the opportunity of buying animals that can provide a positive income. Some players may decide to borrow a loan to help buy animals, which they hope would give them a return of an income that would cover the loan and potentially gain a positive income in the short term. By players receiving a positive income from the animal that was bought with a loan, players are able to use the cash that was earned to purchase another animal that could give them some additional cash to help put them in a position to win and complete a certain level in the game.

For table 3, we carry out different fixed effects models to measure the rate of going bankrupt that may occur in the financial literacy game. For the fixed effects models, the return on investment is statistically significant at the 5 percent level. When considering the outcome of players going bankrupt, adding one more unit to the return on investment would lead to about 0.138 percent decrease in going bankrupt when players play the financial literacy game. As the return on investment increases, this would decrease the rate of going bankrupt for players that continue to play the financial literacy game.

During week four, the rate of going bankrupt in the financial literacy game decreases. Players that play the financial literacy game in week four are 15.67 percent less likely to

experience going bankrupt. As players continue to advance in the game, they manage to stay away from going bankrupt. This is a good sign because this indicates that players are able to make better decisions on purchasing animals in the financial literacy game, since we could expect players to commit less bankruptcy in week four. Regarding the players playing the financial literacy game in week four, we see that the coefficient is statistically significant at the 10 percent level. During week four, we can expect the rate of type two errors of about 12.3 percent to occur when players play the financial literacy game. Since players may pass up on buying animals, it is not surprising to witness that players would avoid going bankrupt during week four of playing the financial literacy game.

In the financial literacy game, a player is offered some information before deciding to purchase an animal. Before a player decides to purchase an animal, they are offered information on the life expectancy of an animal, the price that the animal cost as well as the possible cash that would be gained if they decide to purchase the animal. By providing information about an animal, this can influence a player to choose whether they decide to go with the deal of buying an animal that would provide them a return of a positive or negative income. This is similar to Cai and Song's study, since offering information on the probability of disasters that may occur would allow farmers to make a more informed purchase decision of adopting the insurance (Cai and Song, 2017). With key information provided to players when playing the financial literacy game, this could influence players to make a better judgment on certain deals that they should consider going with. When players continue to progress in the game, we see that the rate of going bankrupt declines as players make more plays in the financial literacy game. As players make progress and continue to reach different levels in the game, they are committing less mistakes of buying bad animals, which tell us that they are engaged with the decisions that they

make when playing the game. This result can be connected to the effect of engagement on learning from game-based learning environments, due to their study finding that engagement has a positive effect on perceived learning (Hamari et al., 2016). When players continue to make good decisions in the game, like buying animals that provide a return of a positive income, they learn to stay away from buying bad animals in the game and this allows them to advance to additional levels when playing the financial literacy game.

#### **4. Summary and Conclusion**

As players continue to play the game for multiple weeks, we find that there is an increase in the rate of type two errors that occur in the financial literacy game. When comparing weeks two and three, there is a significant jump of 9 percent on the rate of type two errors that occur in the financial literacy game. With players passing on the opportunity of buying good animals, this could tell us that they could have lacked confidence in making financial decisions in the game. In a situation where there were less type two errors to occur in weeks three and four, this would indicate that players were more willing to take the chance of buying animals that would provide a return of a positive income. In a good situation, we would want players to buy more animals that can provide them a positive income. This would benefit the players because taking the chance of buying more good animals could allow them to make fewer decisions for a certain level, which allows them to earn cash from multiple animals while setting themselves up to be in a good position to complete a certain level in the financial literacy game.

We can expect the rate of type one errors that occur in the financial literacy game to be higher in week four. During week four, we can expect 0.47 percent of type one errors to occur in the financial literacy game. Although the rate of type one errors to occur is higher in week four, it is good to see that the percentage is not significantly high for the rate of type one errors that

occur in the financial literacy game. As players continue to make more plays and progress in the game, they are able to manage the difficulty that comes with playing levels between four to six in the financial literacy game. When players reach higher levels in the game, they are not constantly buying animals that provide them a return of a negative income. As players stay away from buying bad animals that provide a return of a negative income, they are able to learn how to make better decisions on the animals that they should buy as they continue to progress in the financial literacy game.

With the players playing the financial literacy game for four weeks, players were limited in playing the game for 30 minutes per session. Due to some players not having a mobile device, this may have limited the accessibility of some players being able to play the game for the whole time. Since most players were limited to playing the financial literacy game, this could have limited the amount of decisions that players made when playing the game. For the future, we should consider giving players more time to play the financial literacy game. By providing a minimum of 2 months for players to play the financial literacy game, this could give us a different outcome on players that may commit a type one error or a type two error as they continue to advance in the higher levels of the game. Moving forward, it may be necessary to provide some basic training to people before they play the financial literacy game. By providing a tutorial video of how people can play the game, this could possibly help people have a better understanding of what they could anticipate when they play the financial literacy game.

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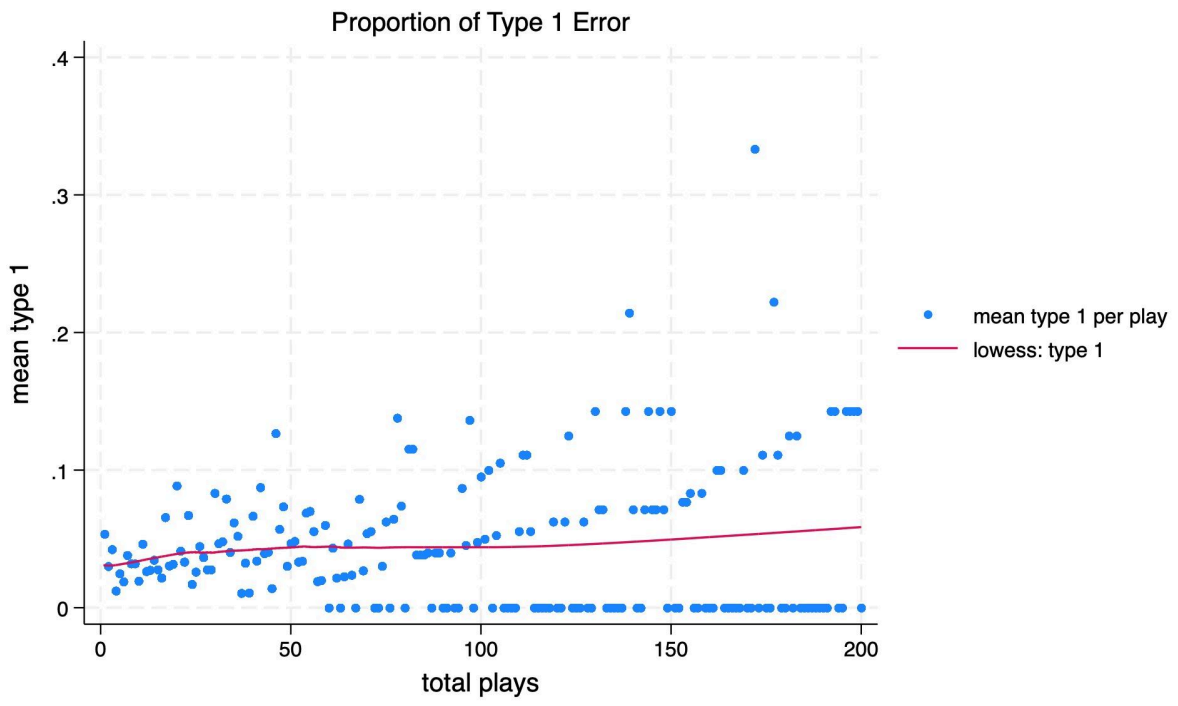


Figure 1: Proportion of Type 1 Error

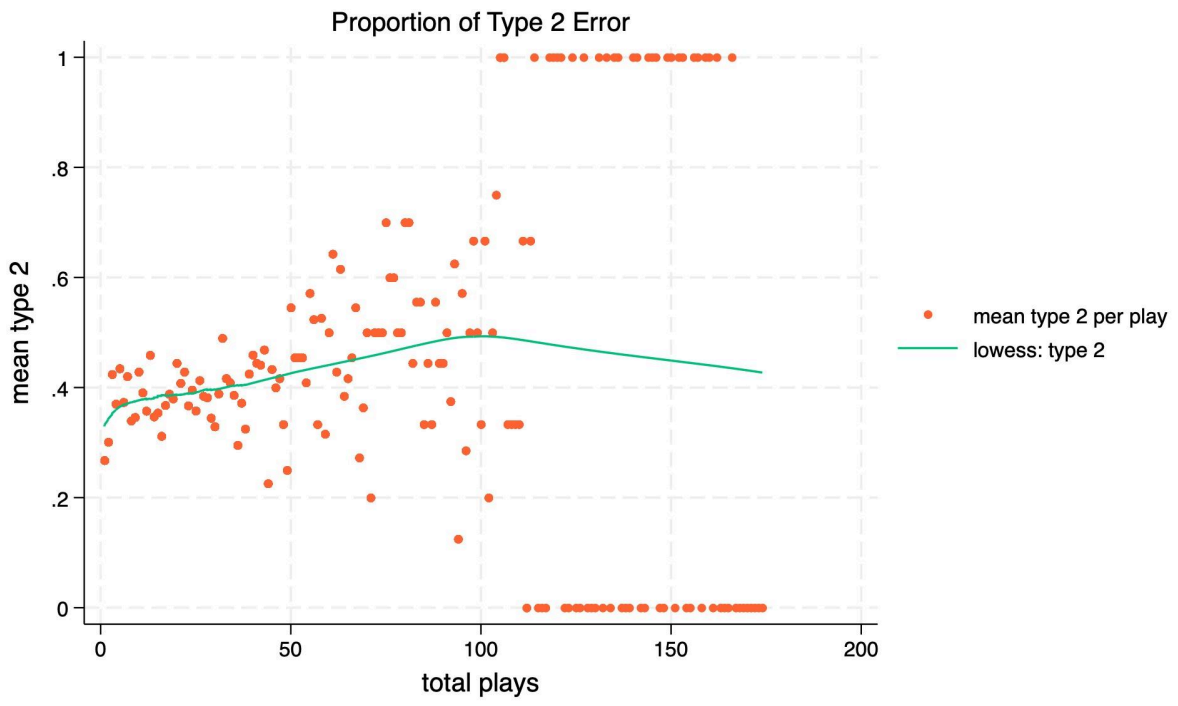


Figure 2: Proportion of Type 2 Error



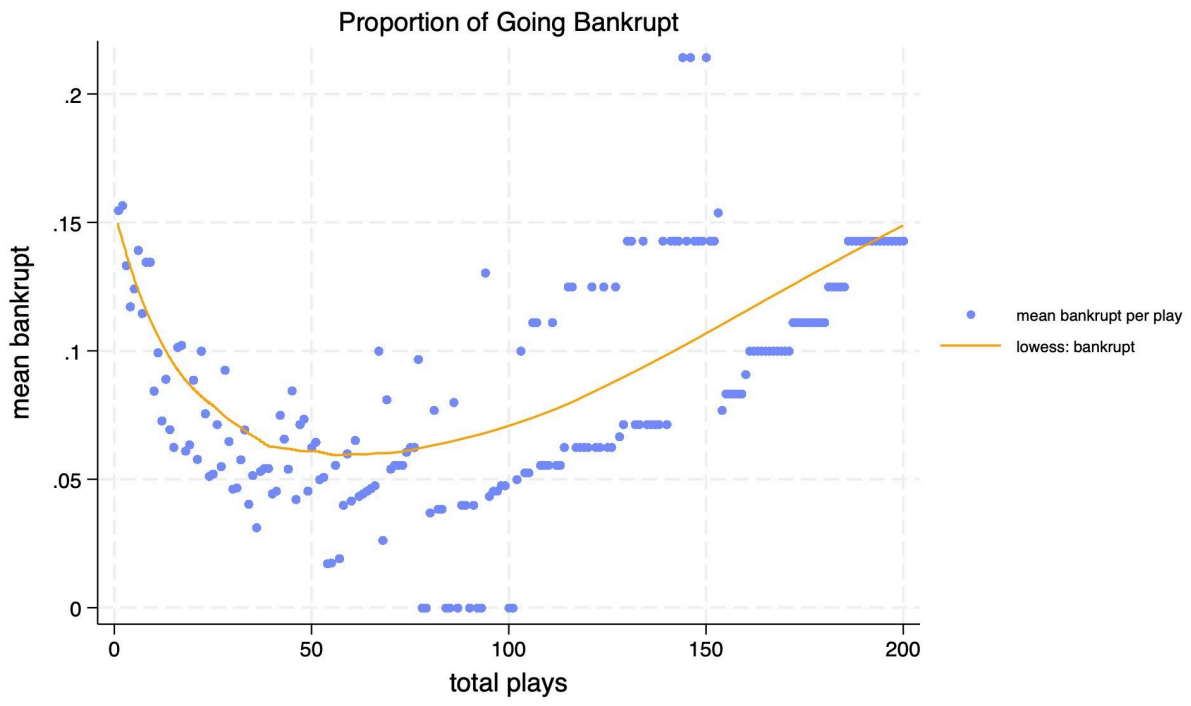


Figure 3: Proportion of Going Bankrupt

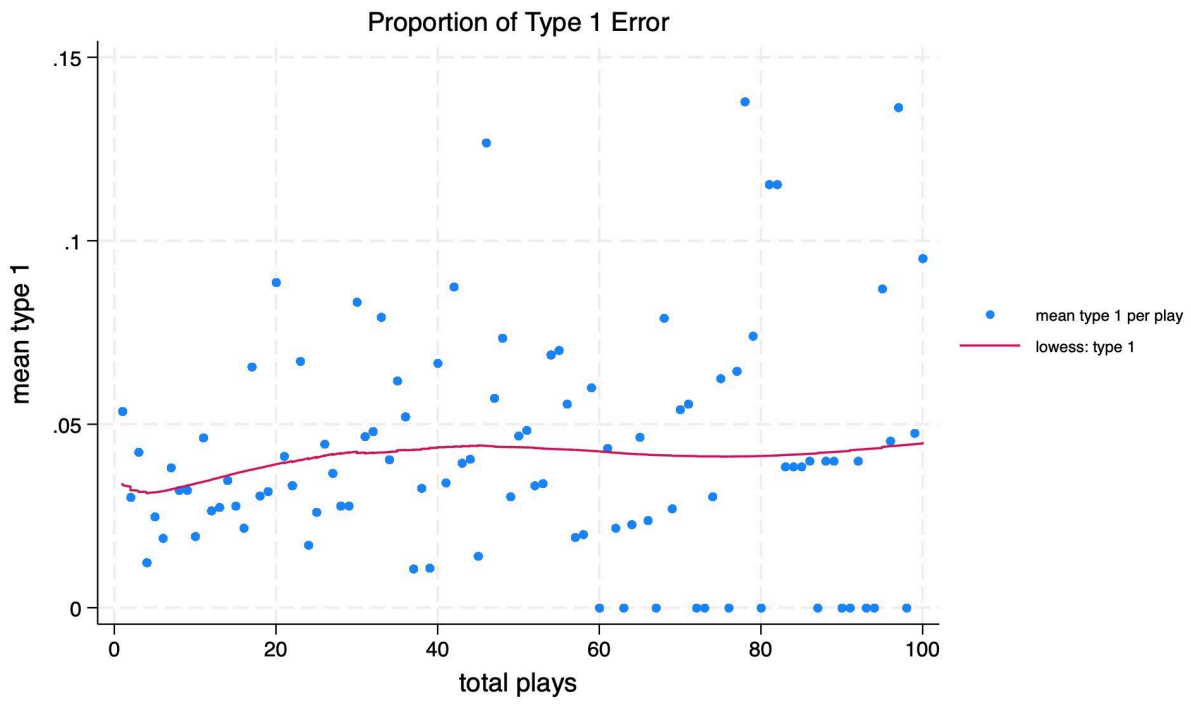


Figure 4: Proportion of Type 1 Error For 100 Plays

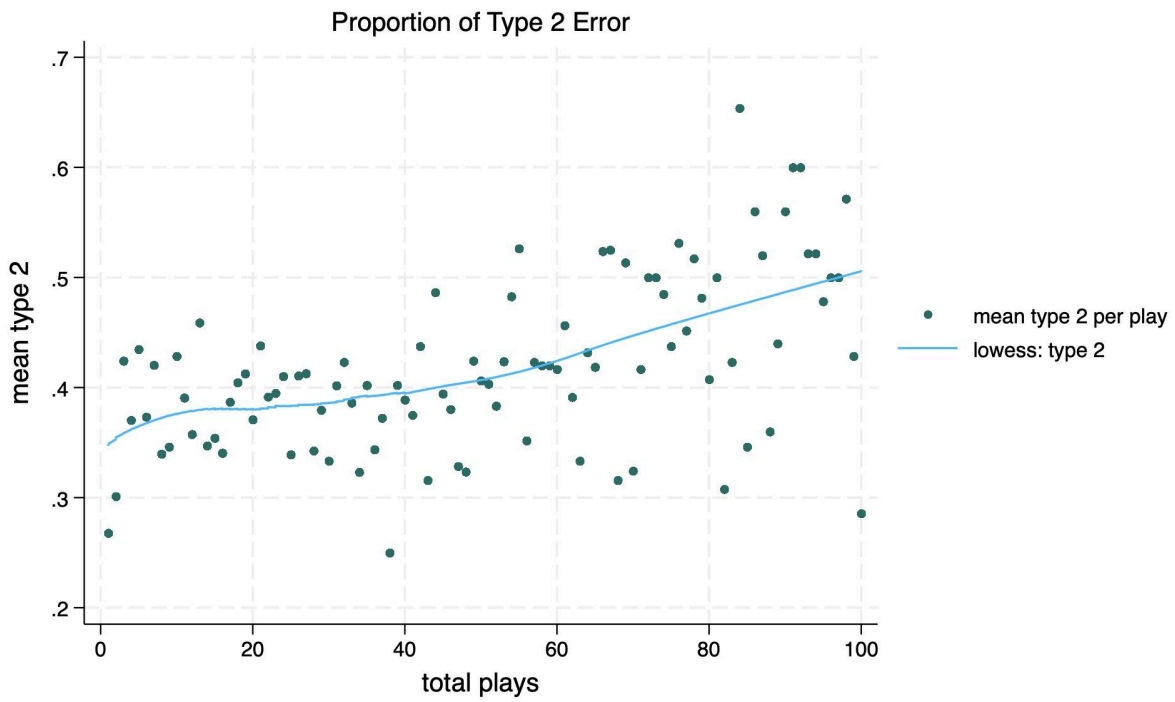


Figure 5: Proportion of Type 2 Error For 100 Plays

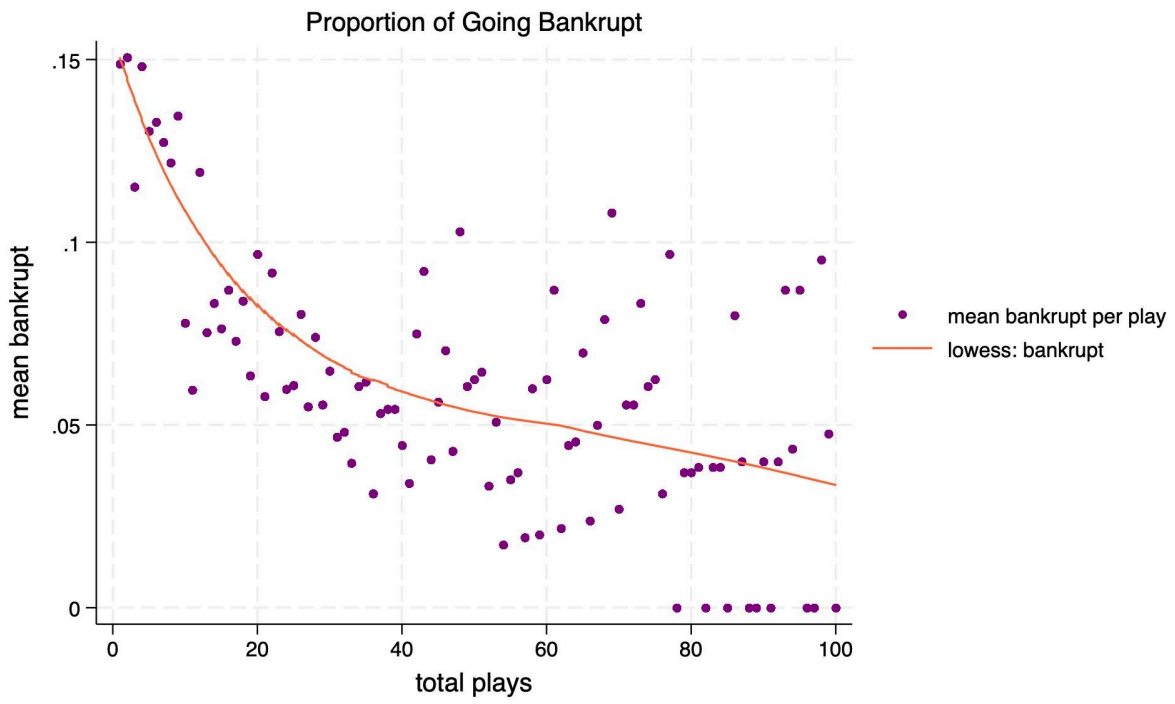


Figure 6: Proportion of Going Bankrupt For 100 Plays

Table 1: Type 1 Error

	(1)	(2)	(3)	(4)
roi	-0.015890*** (0.001766)	-0.015893*** (0.001765)	-0.015890*** (0.001765)	-0.015889*** (0.001766)
week 2		0.005109 (0.008898)	0.003862 (0.009620)	0.001469 (0.011154)
week 3			-0.004854 (0.011790)	-0.007473 (0.010682)
week 4				0.004735 (0.011236)
constant	0.072082*** (0.003458)	0.070407*** (0.004717)	0.071984*** (0.006313)	0.074275*** (0.007470)
N	9,448	9,448	9,448	9,448
R <sup>2</sup>	0.0852	0.0859	0.0865	0.0862

Robust standard errors are in parentheses.

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

Table 2: Type 2 Error

	(1)	(2)	(3)	(4)
roi	0.020450*** (0.002150)	0.020458*** (0.002146)	0.020419*** (0.002140)	0.020406*** (0.002148)
week 2		-0.030870 (0.043281)	-0.013709 (0.045047)	0.045506 (0.045038)
week 3			0.068571 (0.051765)	0.136989*** (0.052144)
week 4				0.122881** (0.047746)
constant	0.351334*** (0.004284)	0.361210*** (0.013589)	0.338986*** (0.022405)	0.282324*** (0.026967)
N	5,203	5,203	5,203	5,203
R <sup>2</sup>	0.0239	0.0242	0.0267	0.0299

Robust standard errors are in parentheses.

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$

Table 3: Bankrupt

	(1)	(2)	(3)	(4)
roi	-0.001358** (0.000657)	-0.001342** (0.000649)	-0.001397** (0.000634)	-0.001378** (0.000609)
week 2		-0.034806 (0.062836)	-0.008027 (0.052410)	-0.087240 (0.063748)
week 3			0.10423 (0.113441)	0.017523 (0.153822)
week 4				-0.156725* (0.083879)
constant	0.084158*** (0.001286)	0.095569*** (0.020957)	0.061699** (0.030352)	0.137525** (0.063942)
N	9,448	9,448	9,448	9,448
R <sup>2</sup>	0.0006	0.0045	0.0116	0.0237

Robust standard errors are in parentheses.

\*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$