

When Financial Platforms Become Gamified, Consumers' Risk Preferences Change

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ABSTRACT Does gamifying financial platforms change consumers' willingness to take financial risk? A major trend in the financial industry has been to make financial platforms gamelike experiences by adding features like leaderboards. However, despite the growing interest in this approach, no research has systematically investigated whether and how gamification influences consumers' financial risk taking. Six experiments ($N = 3,766$) demonstrate that when investment apps are equipped with game elements, consumers make substantially riskier choices. Gamification boosts financial risk taking because the presence (vs. absence) of game elements motivates consumers to pursue an additional goal (i.e., winning the game). Once this goal has been reached, consumers are no longer more risk-taking, highlighting when and why gamification entices financial risk taking. This research validates recent suspicions about the addictive potential of gamified financial platforms and helps inform discussions about how to make these platforms more consumer-friendly.

Should finance be a game? Investment apps and other financial platforms are increasingly starting to resemble one. From using leaderboards to celebrate stock trades (*XU Magazine* 2021) to offering 3D games to introduce consumers to investing (Fidelity Investments 2022), Fintech startups like Revolut and established institutions like Fidelity Investments have begun to gamify their financial platforms. By adding features like leaderboards, badges, and levels, financial institutions aim to motivate consumers to further engage with their platforms (Gilbert 2022). Indeed, gamified financial platforms have enjoyed substantial growth in recent years. For example, Robinhood, a pioneer in gamified consumer finance, expanded its customer base from 12.5 million investors in 2020 to 22.7 investors in 2021 (Nasr 2023)—a disproportionately high growth rate of 82%, considering the industry average of 49% (Curry 2023). eToro, another big player in gamified consumer finance, registered 23.2 million users in 2022, almost double the user count compared to 2 years before (Kranjec 2021). In a pilot study, we asked 1,013 investors about their familiarity with gamified invest-

ment platforms and found that 96% of them were familiar with at least one of these platforms (see app. A; apps. A–G are available online).

Despite gamified financial platforms becoming increasingly popular, do they harm consumers? Industry experts have opposing opinions. On the one hand, gamification can introduce consumers to important financial topics, such as investing for retirement, early in their lives (Gilbert 2022). On the other hand, gamification might lure inexperienced investors into bad financial decisions (Soppitt 2021), a potential danger that has led industry regulators to scrutinize gamified financial platforms. For example, the Securities and Exchange Commission has started monitoring gamified financial platforms (Franck and Fitzgerald 2021), and regulators in Massachusetts have filed legal action against a major Fintech company because of its gamification attempts (Platt and Darbyshire 2020).

One question is whether gamifying financial platforms leads consumers to adopt a gambling mindset and thus take excessive financial risk. This would be especially problematic

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in light of America's growing gambling problem and its downstream consequences, such as increased debt, depression, and crime (Farrell 2018). Suspicion about the addictive potential of gamified financial platforms started circulating when some users began to report staggering financial losses, which drove a 20-year-old man to suicide (Popper 2021). Indeed, gamified financial platforms use design elements similar to those in online casinos (e.g., leaderboards; Draft-Kings 2023), which justifies concerns that gamification might lead to gambling-like behavior.

However, despite the growing prevalence of gamified consumer finance, there is a lack of research that examines consumers' risk taking when financial decisions are embedded in gamified platforms. Our research addresses this gap by investigating whether consumers' risk taking changes when financial platforms include game elements. Specifically, we ask: Does gamifying financial platforms cause consumers to take more risk?

By answering this question, our research contributes to three streams of literature. First, we contribute to the literature on consumer financial risk taking, which suggests that consumers are generally risk-averse when choosing between financial gains (Kahneman and Tversky 1979)—a risk preference that has been found to be stable across a variety of contexts, including spending (Okada and Hoch 2004) and investing (Barberis, Mukherjee, and Wang 2016). Our research shows that consumers gradually depart from this risk preference when financial decisions take place in gamified environments.

Second, we heed calls from the financial decision-making literature to examine “ways to encourage consumers to participate in the stock market” and other capital markets (Greenberg and Hershfield 2019, 25). In particular, researchers have been interested in the effectiveness of pairing financial decisions with contextual cues like credit scores (Homonoff, O'Brien, and Sussman 2021) or minimum payments (Hirshman and Sussman 2022). Our work broadens this literature by examining game elements as novel contextual cues from outside the financial domain, which have not been sufficiently researched.

Third, we contribute to the literature on gamification by studying a novel outcome: financial risk taking. Some have suggested that gamification can positively influence consumers' financial well-being (Bayuk and Altobello 2019) and saving intentions (Zhang, Van Horen, and Zeelenberg 2021). We challenge these suggestions by showing that gamification increases risk taking, thereby jeopardizing consumers' money. Moreover, we heed calls to uncover psychological factors

that help explain how consumers behave in gamified environments (Seaborn and Fels 2015). In particular, scholars have recommended further studying how gamification influences consumers' goals (Landers, Bauer, and Callan 2017). We show that gamified environments activate a competitive goal of winning the game, which prompts consumers to take more risk.

CONCEPTUAL DEVELOPMENT

Consumers' Financial Risk Taking

Financial decisions either directly relate to financial platforms or substantially affect consumers' financial well-being (Greenberg and Hershfield 2019). Within the financial decision-making literature, research has sought to understand factors that influence financial risk taking because unhealthy levels of risk can impair consumer well-being (e.g., lower happiness; Farrell 2018), company performance (e.g., lower return on sales; Bromiley 1991), and societal welfare (e.g., higher crime rates; Adolphe et al. 2019).

In finance, risk refers to the extent to which a financial decision involves uncertain outcomes (March and Shapira 1987), while risk preference refers to a person's tendency to pursue or avoid risk (Sitkin and Pablo 1992). For example, investing in a stock that offers a 50/50 chance of gaining either 1 or 5 dollars is riskier than investing in a stock that offers a sure gain of 3 dollars. An overarching theme in the financial decision-making literature is that consumers are risk-averse in the realm of gains (Kahneman and Tversky 1979). For example, most consumers prefer a sure gain of 3 dollars over a 50/50 chance of gaining either 1 or 5 dollars. Researchers have observed this risk aversion in a variety of financial contexts, including spending (Okada and Hoch 2004) and investing (Barberis et al. 2016). Could adding game elements to financial platforms make consumers less averse to risk?

How Gamification Influences Consumers'

Financial Risk Taking

Gamification—defined as the use of game elements in non-gaming contexts (Deterding et al. 2011)—turns serious tasks into gamelike experiences (Landers et al. 2019). Examples of game elements include leaderboards, levels, and badges. The resulting gamelike experiences offer additional consumer value (Huotari and Hamari 2017). In the case of gamified investing, for example, consumers gain value from moving up the leaderboard, unlocking new levels, and winning prestigious badges, in addition to the financial value they derive from the investment decision itself. If executed effectively,

gamification can immerse consumers in a flow-like state, which has been characterized as a feeling of energized focus and full participation while performing a task (Oliveira et al. 2021).

Although prior research has not studied the effects of game elements on consumers' risk preferences, it has shown that other features of the financial decision-making context can shape consumers' willingness to take risk. For example, giving consumers access to their credit scores makes them more likely to pay their debt on time, thereby reducing the risk of late payment fees (Homonoff et al. 2021). Conversely, requiring minimum payments causes consumers to spread debt repayments across multiple credit card accounts, thereby risking larger interest costs (Hirshman and Sussman 2022). Moreover, aesthetically pleasing financial documents make consumers more likely to invest in a company, thereby increasing the risk of irrational decisions (Townsend and Shu 2010). Many of the observed contextual effects on consumers' financial decision making have focused on financial cues (e.g., credit scores). In contrast, much less is known about whether nonfinancial cues influence risk taking. We predict that game elements, relatively novel cues within financial platforms, can prompt consumers to take more risk.

Indeed, research outside the financial domain finds that games—understood as systems in which players engage in an artificial conflict, defined by rules, that result in a quantifiable outcome (Salen and Zimmerman 2003)—can lead to risky behavior. For example, competition in sports games can tempt players to choose riskier plays, as exemplified by football teams that are more likely to go for touchdowns, instead of settling for less risky field goals, when playing against their rivals (To et al. 2018). Analogously, video racing games, in which multiple players compete against one another, affect consumers' risky driving in real-world traffic (Stollberg and Lange 2020). Finally, in talk show games, in which players mainly compete against themselves, consumers are more likely to choose risky strategies than in environments that do not resemble games (Baltussen, van den Assem, and van Dolder 2016). While this literature has demonstrated that games can boost risk taking, it has done so mainly for domains outside of finance. In contrast, research has not explored whether adding game elements to serious financial tasks (e.g., investing), which are normally not gamelike, amplifies financial risk taking. We predict that it does:

H1: Gamified (vs. nongamified) platforms tempt consumers to take more financial risk.

Why and When Gamification Influences Consumers' Financial Risk Taking

Games stimulate competition because they direct players' attention to a goal to win (Salen and Zimmerman 2003), which can mean scoring more points than others, finishing first, or defeating others on some other quantifiable outcome (Zagal, Debus, and Cardona-Rivera 2019). As such, gamified environments differ from playful environments in that they provide a specific goal and universal rules to win the game (Caillois 2001). In gamified financial platforms, winning the game can mean being atop a leaderboard, reaching the highest level, or unlocking the most prestigious badge, depending on what game element is being deployed. Game elements have a motivating effect similar to that of setting highly ambitious goals, indicating that consumers normally strive for victory within gamified environments (Landers et al. 2017). Hence, we suggest that adding game elements to financial platforms motivates consumers to take more risk because they no longer just want to maximize their financial outcome; instead, they also want to satisfy the additional goal of winning the game.

Indeed, goals—defined as desirable states that consumers intend to attain through their actions (Van Osselaer et al. 2005)—bolster consumers' willingness to take risk in situations that resemble gamelike environments. In social contexts, for example, in which consumers are tempted to compare themselves with others, they aim for others' accomplishments, which makes them more willing to accept risk (Hill and Buss 2010). Moreover, in competitive environments like sports, reward tokens like trophies also prompt players to take more risk (To et al. 2018). Once teams are on course to win the game, their focus shifts to defense, making them less risk-taking (Polman, Van Swol, and Hoban 2020). Similarly, in poker games, in which players want to win more chips than their competitors, consumers tend to play riskier hands when they are not the chip leader versus when they are (Eil and Lien 2014).

Importantly, the goal to win the game can change how consumers perceive and evaluate financial outcomes (Heath, Larrick, and Wu 1999). In gamified financial platforms, in which a certain amount of earnings is necessary to win the game, consumers experience a higher value when they hit this earnings goal compared to when they generate the same earnings in nongamified platforms. For example, if gaining \$100 is necessary to be atop the leaderboard, consumers not only gain \$100—as they would in nongamified platforms—but they also win the game, which constitutes additional motivation to take risk.

If our hypothesized process is correct, it suggests a boundary condition: goals motivate behavior only when they are not already met. Once goals are reached, their effect on behavior attenuates (Chartrand et al. 2008). Therefore, we predict that gamification increases financial risk taking only when consumers have not earned enough money to satisfy their goal of winning the game. In contrast, when consumers have already earned enough money to win the game, they will prefer a similar or even lower level of risk as when the environment is not gamified.

H2: Gamified (vs. nongamified) platforms no longer tempt consumers to take more financial risk when consumers have satisfied their goal of winning the game.

OVERVIEW OF STUDIES

Six experiments test whether gamification prompts consumers to make riskier financial decisions. Study 1 reveals that consumers are willing to invest more in risky stocks in a gamified investment app with leaderboards, badges, and levels than in a nongamified one without game elements. Studies 2 and 3 demonstrate that merely adding a leaderboard to an investment app makes consumers more likely to choose a risky stock. Studies 4 and 5 (plus a replication reported in the web appendixes) reveal that consumers are more risk-taking within gamified investment apps only when their past stock earnings are not sufficient to be at the highest level (study 4) or rank first on a leaderboard (study 5). Conversely, if consumers have already generated high stock earnings that would place them atop these game elements, they are no longer more risk-taking, which suggests that the goal of winning the game drives consumers' enhanced risk taking within gamified platforms. Data and syntax for our studies can be retrieved from the Open Science Framework: <https://osf.io/sr7aq/>.

STUDY 1: GAMIFIED PLATFORMS INCREASE FINANCIAL RISK TAKING

The objective of study 1 was to test hypothesis 1, which states that gamified (vs. nongamified) platforms tempt consumers to take more financial risk. To test this hypothesis, we asked participants how many shares of risky stocks they would buy when using either a gamified investment app or a conventional, nongamified one. We uploaded materials and a data collection plan prior to launching the study: <https://osf.io/xsn46/>.

Method

Undergraduate students ($N = 255$; $M_{age} = 20.48$, 56% female) completed a 2 (gamification: gamified, nongamified) \times 3 (investment replicate) mixed-design experiment. Participants indicated how much they would invest in three different risky stocks (within-subjects replicate) while using an investment app that either included or did not include game elements (between-subjects manipulation).

Participants imagined using a new investment app that included stock analytics, a trading platform, news about the stock market, and personalized settings. In the gamified condition, participants also learned that the app has a built-in leaderboard, gamelike levels, and prestigious badges, which are based on investors' investment and trading volume. In the nongamified condition, the app did not have these game elements (see app. B). After a short practice session, participants indicated how many shares they would buy of each of three risky stocks on a slider ranging from 0 to 50 shares (see app. C). For example, one stock had a price of \$10 per share and had a 65% chance to double in value but also a 35% chance to halve in value. This measure was adapted from previous research in the financial decision-making literature, which has treated a higher (vs. lower) investment volume as more (vs. less) financial risk taking (Kuhnen, Samanez-Larkin, and Knutson 2013).

Results

As predicted, a 2 (gamification: gamified, nongamified) \times 3 (investment replicate) mixed-model ANOVA revealed that participants were willing to invest more in risky stocks when using a gamified investment app ($M = 21.41$ shares) versus a nongamified investment app ($M = 18.49$ shares; $F(1, 253) = 4.22$, $p < .05$, $\eta_p^2 = .02$; see fig. 1). The effect of gamification was consistent across the three risky stocks (interaction of gamification and the investment replicate: $F(2, 506) = .57$, $p = .57$, $\eta_p^2 = .00$).

Discussion

Study 1 reveals that merely reading that an investment app has leaderboards, badges, and levels, without learning any specific details about these game elements, increased the volume that participants would invest in risky stocks, supporting hypothesis 1. However, a given investment volume might be considered risky by some participants but less risky by others, which makes it difficult to determine participants' risk preferences. Hence, our subsequent studies use binary choices between risky and riskless investments. Moreover, all subsequent studies were conducted online, which enabled us to

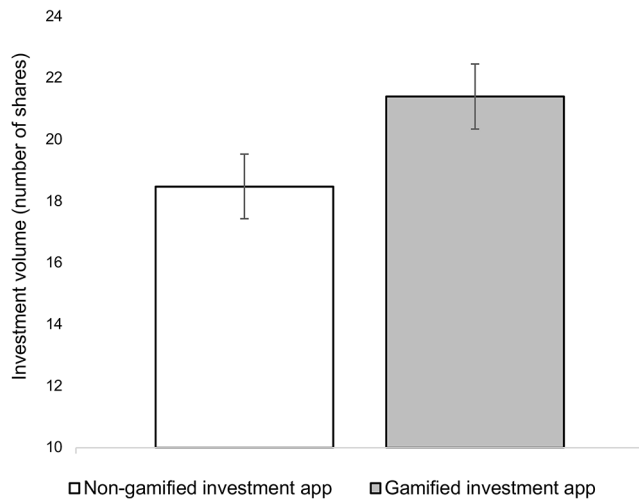


Figure 1. Participants were willing to invest more in risky stocks within a gamified (vs. nongamified) investment app. Error bars represent the standard error of the mean.

recruit larger and more diverse samples, thereby improving the statistical power and external validity of our results (see app. D for a power analysis).

STUDY 2: LEADERBOARDS INCREASE FINANCIAL RISK TAKING

The primary objective of study 2 was to provide additional support for hypothesis 1 while manipulating gamification using leaderboards—one of the most common elements in gamified platforms, which rank consumers according to their relative success compared to others (Seaborn and Fels 2015). A secondary objective was to measure financial risk taking using another well-validated measure: the choice between a risky or a riskless investment (Martin, Reimann, and Norton 2016). We uploaded materials and a data collection plan prior to launching the study: <https://osf.io/jr78k/>.

Method

CloudResearch panelists ($N = 627$; $M_{age} = 42.13$, 48% female) completed a between-subjects experiment with two conditions (gamification: leaderboard, no leaderboard). As preregistered, we excluded 20 participants for not responding to our dependent measure.

Participants read that they had downloaded a new investment app to buy stocks. After completing a short practice session to familiarize themselves with the app, they chose between a risky (stock A: 50/50 chance of gaining either \$1

or \$5) or riskless investment (stock B: sure gain of \$3; Martin et al. 2016). Participants in the gamified condition were also shown a leaderboard of investors on which they currently occupied the 103rd position with \$0 in stock earnings and read that their stock earnings would affect their standing on the leaderboard. The investor in the 102nd position had \$4 in stock earnings. Participants in the nongamified condition made their choice without seeing a leaderboard (see app. E). Finally, participants responded to additional exploratory measures (see app. F).

Results

As predicted, chi-squared tests revealed that participants were more likely to choose the risky stock when a leaderboard was present (24%) versus absent (10%; $\chi^2(1) = 19.49$, $p < .001$, $\phi = .18$; see fig. 2).

Discussion

Study 2 illustrates that adding a leaderboard to an investment app more than doubled participants' choice of a risky stock—a substantial increase considering the effect sizes of other contextual factors reported in the financial decision-making literature (e.g., financial resources; He, Inman, and Mittal 2008). This finding further supports hypothesis 1. However, a potential concern with this study is that the leaderboard may have incentivized participants to pick the risky stock because it was the only option that could help them surpass other investors. That is, the specific values on the leaderboard, rather than the presence of the leaderboard

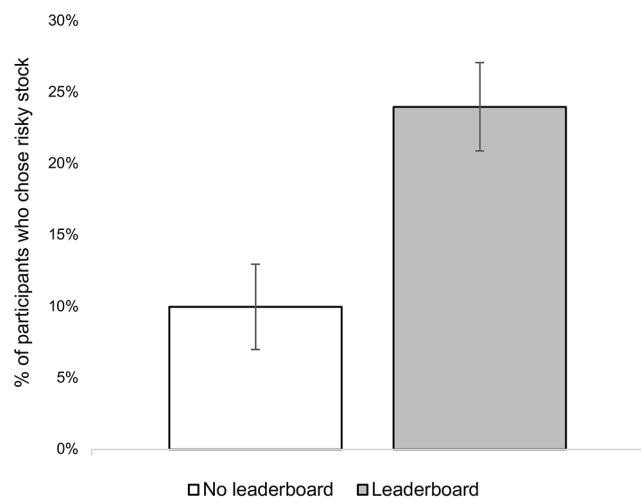


Figure 2. Participants were more likely to choose a risky stock in an investment app with a leaderboard (vs. one without a leaderboard). Error bars represent the standard error of the proportion.

itself, may have prompted participants to select the riskier investment. Study 3 addresses this concern by adding a third condition in which both the risky and the riskless stocks would move participants up the leaderboard.

STUDY 3: THE MERE ADDITION (RATHER THAN THE STRUCTURE) OF LEADERBOARDS INCREASES FINANCIAL RISK TAKING

The objective of study 3 was to provide further support for hypothesis 1 while disentangling what aspect of a leaderboard drives the effect of gamification on financial risk taking. Specifically, we tested whether the mere addition of a leaderboard, rather than the risk-incentive structure of the leaderboard, drives the effect. The risk-incentive structure refers to whether participants needed to select the risky stock or could also select the riskless stock to move up the leaderboard. We uploaded materials and a data collection plan prior to launching the study: <https://osf.io/gd6y2/>.

Method

CloudResearch panelists ($N = 615$; $M_{\text{age}} = 40.58$, 45% female) completed a between-subjects experiment with three conditions (gamification: leaderboard with a high risk-incentive structure, leaderboard with a low risk-incentive structure, no leaderboard). As pre-registered, we excluded 13 participants for not responding to our dependent measure.

Study 3 followed a similar procedure to study 2, except that there was a third condition that manipulated the earnings of the investor above the participant in the leaderboard. In both leaderboard conditions, participants occupied the 841st position with \$0 in stock earnings. In the high risk-incentive structure condition, the investor in the 840th position had \$4 in stock earnings (similar to study 2). In the low risk-incentive structure condition, this investor had only \$2 in stock earnings, so participants could move up the leaderboard even by selecting the riskless stock. Participants in the no leaderboard condition did not see a leaderboard. Participants again chose between a risky (stock A: 50/50 chance of gaining either \$1 or \$5) or riskless investment (stock B: sure gain of \$3).

Results

We ran chi-squared tests to examine whether the mere addition of a leaderboard increases risk taking or whether participants only take more risk when the structure of the leaderboard incentivizes them to do so. First, we tested whether the addition of a leaderboard increased risk taking by com-

paring the two conditions with a leaderboard to the condition without a leaderboard. As predicted, participants were more likely to choose the risky stock when a leaderboard was present (24%) versus absent (16%; $\chi^2(1) = 4.41$, $p < .05$, $\varphi = .09$). Next, we tested whether the risk-incentive structure of the leaderboard influenced risk taking by comparing the two conditions with a leaderboard. We found that participants were equally likely to choose the risky stock when the leaderboard had a high risk-incentive structure (26%) versus a low risk-incentive structure (22%; $\chi^2(1) = .68$, $p = .41$, $\varphi = -.04$), indicating that participants' risk taking was largely driven by the addition of a leaderboard rather than the structure of the leaderboard.

Discussion

Study 3 provides converging support for hypothesis 1 that gamified (vs. nongamified) platforms tempt consumers to take more financial risk. Importantly, study 3 shows that this greater risk taking is driven by the mere addition of game elements rather than how these elements are structured. Study 3 also sheds light on the goals that consumers likely pursue in gamified financial platforms. Participants seemed to care less about guaranteed single increases in the leaderboard, whereas they were willing to take financial risk if it meant that they would climb the leaderboard by multiple positions, thereby getting closer to winning the game. Next, we further investigate whether the goal to win the game can explain why and when gamification increases consumer financial risk taking.

STUDY 4: LEVELS NO LONGER INCREASE FINANCIAL RISK TAKING WHEN CONSUMERS ARE WINNING THE GAME

We propose that game elements motivate consumers to pursue an additional goal of winning the game, which makes them take more financial risk. The objective of study 4 was to test this proposed mechanism by using a process-by-moderation approach. Because goals are released, and thus no longer influence behavior, once they are met (Chartrand et al. 2008), we predict that gamified (vs. nongamified) platforms no longer increase financial risk taking when consumers have already earned enough money to win the game (hypothesis 2). We tested this hypothesis by manipulating both the presence of levels—commonly used game elements that consumers can unlock by performing well (Seaborn and Fels 2015)—and participants' previous stock earnings. Here, winning the game meant reaching the highest level. We uploaded

materials and a data collection plan prior to launching the study: <https://osf.io/ncjxq/>.

Method

Prolific panelists ($N = 821$; $M_{\text{age}} = 40.27$, 38% female) completed a 2 (gamification: levels, no levels) \times 2 (earnings: low, high) between-subjects experiment. As preregistered, we excluded 20 participants for not responding to our dependent measure.

Study 4 followed a similar procedure to studies 2 and 3 except that we manipulated gamification using levels as well as participants' previous stock earnings. Participants in the gamified condition were shown an app that included five different levels, from rookie (the lowest level) to diamond (the highest level). Participants read that their stock earnings would affect their level. Orthogonally, we manipulated participants' previous earnings. Participants in the low earnings condition were told that they had gained \$0. In the levels condition, this placed them at the rookie level. Participants in the high earnings condition read that they had gained \$100. In the levels condition, this placed them at the diamond level. Participants in the no levels condition likewise read that they had gained either \$0 or \$100 but did not see levels. Participants again chose between a risky (stock A: 50/50 chance of gaining either \$1 or \$5) or riskless investment (stock B: sure gain of \$3).

Results

A binary logistic regression with gamification, stock earnings, and their interaction as independent variables and the choice of the risky stock as dependent variable revealed the predicted interaction between gamification and stock earnings ($b = -.80$, $SE = .37$, $p < .05$, $OR = .45$). Participants who had low earnings (and thus were not at the highest level in the gamified condition) were more likely to choose the risky stock when levels were present (24%) versus absent (11%; $b = .97$, $SE = .29$, $p < .001$, $OR = 2.63$). In contrast, participants who had high earnings (and thus were at the highest level in the gamified condition) were equally likely to choose the risky stock when levels were present (24%) versus absent (21%; $b = .17$, $SE = .24$, $p = .48$, $OR = 1.18$; see fig. 3).

Discussion

Study 4 supports our proposed mechanism by employing a process-by-moderation approach. Consistent with hypothesis 2, we find a difference in risky choice between the gam-

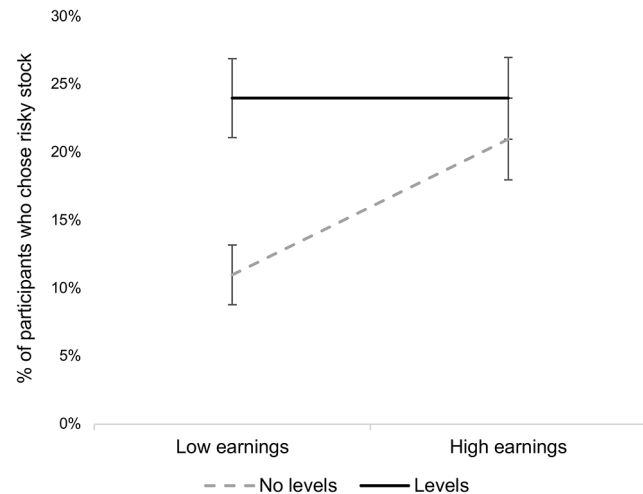


Figure 3. Participants were more likely to choose a risky stock in an investment app with levels (vs. one without levels) only when participants' stock earnings did not already place them at the highest level. Error bars represent the standard error of the proportion.

ified and nongamified investment apps only when participants' prior earnings were not sufficient to be at the highest level. When participants' prior earnings were already sufficient to be atop the level hierarchy, they chose similarly regardless of whether the investment app was gamified or not, which suggests that the additional goal of winning the game explains why consumers take more risk within gamified platforms. To ensure that the results were robust to different game elements, we replicated these findings by manipulating whether participants saw a leaderboard, as in studies 2 and 3, instead of levels (see app. G).

Although the results were consistent with hypothesis 2, we were surprised that participants in the gamified app did not become less risk-taking after they had satisfied their goal to win the game. Instead, the interaction effect was driven by participants in the nongamified app who became more risk-taking as they earned more money—an observation that prior research coined the “house money” effect (Thaler and Johnson 1990). We think that this unpredicted house money effect (i.e., increased risk taking after earning more money) may have also increased risk taking in the gamified condition, which offset a decreased preference for risk amongst participants who were winning the game. While this post-hoc explanation is plausible, we sought stronger evidence that winning the game can decrease risk taking by increasing the level of risk in study 5, such that choosing the riskier option could cause participants using the gamified app to lose their winning position.

STUDY 5: LEADERBOARDS CAN DECREASE FINANCIAL RISK TAKING WHEN CONSUMERS ARE WINNING THE GAME

The objective of study 5 was to examine how participants behave when they not only are winning the game but also need to defend their winning position. If we are correct that consumers in gamified platforms are motivated by an additional goal to win the game, they should be particularly averse to choosing a risky investment that involves both gains and losses when they are in the winning position, because losing money also means potentially losing their winning position (Polman et al. 2020). The objective of study 5 was to test this prediction. We uploaded materials and a data collection plan prior to launching the study: <https://osf.io/gw685/>.

Method

CloudResearch panelists ($N = 615$; $M_{\text{age}} = 40.65$, 48% female) completed a 2 (gamification: leaderboard, no leaderboard) \times 2 (earnings: low, high) mixed-design experiment. Participants choose between a risky or riskless stock after having accumulated different levels of earnings (within-subjects manipulation) while using an investment app that either included or did not include a leaderboard (between-subjects manipulation).

Study 5 followed a similar procedure to study 4 except that gamification was manipulated by using a leaderboard, the risky stock choice included both potential gains and losses, and stock earnings were manipulated within-subjects. Participants made their first choice after reading that they had gained \$0 in stock earnings (low earnings). In the leaderboard condition, this placed participants 12th on the leaderboard. Next, participants made a filler choice to strengthen the cover story that their choices moved them all the way up to the first position in the leaderboard. Finally, participants made their last choice after reading that that they had gained \$27 in stock earnings (high earnings). In the leaderboard condition, this placed participants first on the leaderboard. Participants in the no leaderboard condition likewise read that they had gained \$0 and \$27 but did not see a leaderboard. For both low and high earnings, participants made the same choice between a risky (stock A: 50/50 chance of either losing \$6 or gaining \$14) or riskless investment (stock B: sure gain of \$4).

Results

Generalized estimating equations with gamification, stock earnings, and their interaction as independent variables and the choice of the risky stock as dependent variable again re-

vealed the predicted interaction ($Wald \chi^2(2) = 89.17$, $p < .001$). When participants had low earnings (and thus were not atop the leaderboard in the gamified condition), they were more likely to choose the risky stock when a leaderboard was present (43%) versus absent (24%; $\chi^2(1) = 24.76$, $p < .001$, $\phi = .20$). Conversely, when participants had high earnings (and thus had reached the top of the leaderboard in the gamified condition), the effect of gamification on financial risk taking reversed: Participants were less likely to choose the risky stock when a leaderboard was present (24%) versus absent (52%; $\chi^2(1) = 49.42$, $p < .001$, $\phi = -.29$; see fig. 4).

Discussion

Study 5 provides convergent support for hypothesis 2. The effect of gamification on financial risk taking reversed once participants had reached the first position in the leaderboard. This finding further suggests that the additional goal to win the game drives consumers' risk taking within gamified financial platforms. When participants had not yet earned enough money to win the game, they were willing to take risk. Once they had earned enough money to win and losing money also meant potentially losing their first position, they were no longer willing to take financial risk and instead became more risk-averse. This was opposite of what we observed in the nongamified app, in which participants became more risk-taking the more money they

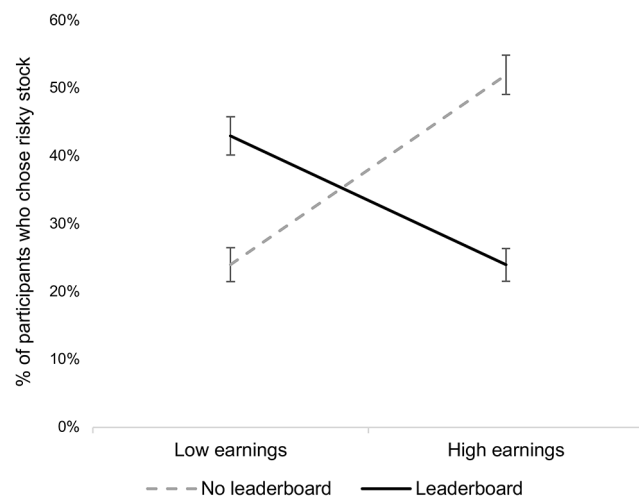


Figure 4. Participants were more likely to choose a risky stock in an investment app with (vs. without) a leaderboard only when their stock earnings did not already rank them first. Once participants were ranked first and they had to defend their winning position, they were less likely to choose the risky stock. Error bars represent the standard error of the proportion.

had earned—a pattern consistent with both our results in study 4 and the house money effect documented in prior research (Thaler and Johnson 1990).

GENERAL DISCUSSION

Financial institutions are increasingly equipping their platforms with leaderboards, levels, and other features to create gamelike experiences. We reveal a concern regarding this trend: gamified platforms tempt consumers to take more financial risk (study 1). We show that the mere presence of game elements is sufficient to make consumers more likely to choose a risky investment (studies 2 and 3). Finally, we suggest that consumers are more risk-taking when using gamified financial platforms because the presence of game elements creates an additional goal: rather than only trying to make money, consumers want to win the game by reaching a higher level (study 4) or climbing a leaderboard (study 5). Importantly, consumers only take more risk in gamified platforms when they do not already feel that they are winning, which suggests that consumers' goal of winning helps explain both why and when gamification increases financial risk taking.

Theoretical Contributions

Our research contributes to the literatures on risk taking, context effects, and gamification. First, we reveal that gamifying financial platforms alters consumers' typical risk preferences (Kahneman and Tversky 1979). Consumers are generally risk-averse across different contexts that involve financial gains, including spending (Okada and Hoch 2004) and investing (Barberis et al. 2016). Our research shows that consumers become less risk-averse when financial platforms include game elements that turn complex financial decisions into gamelike experiences. This finding supports the notion brought forward by experience theorists who have argued that consumers are more risk-taking for positive experiences than monetary gambles (Martin et al. 2016). Extending this work, the present research elucidates that consumers also take more risk when financial decisions themselves become experiential.

Second, our research heeds calls to examine “ways to encourage consumers to participate in the stock market” and other capital markets (Greenberg and Hershfield 2019, 25). Researchers have been particularly interested in the effectiveness of pairing financial decisions with contextual cues. For example, access to one's credit score reduces consumers' willingness to risk late payment fees (Homonoff et al. 2021). Minimum payment requirements, on the other hand, cause consumers to risk larger interest costs (Hirshman and

Sussman 2022). As this work shows, contextual factors contribute to both consumers' risk seeking and risk aversion, justifying a close examination of the various contextual factors in financial decisions and their influence on risk preferences. The present research broadens this work by examining game elements as novel contextual cues within financial platforms.

Finally, our research extends the literature on gamification. Most research has studied how gamification changes consumer behavior outside of finance (e.g., learning; Sailer and Homner 2020). The few exceptions within the financial domain have suggested that gamification may positively influence consumers' financial well-being (Bayuk and Altobello 2019). For example, Zhang et al. (2021) found that consumers' saving intentions are higher when presented with a leaderboard. We challenge these assumptions by showing that, although gamification can motivate consumers to reach their financial goals, it also makes consumers more likely to risk their money. Moreover, we heed calls from the gamification literature to uncover psychological factors that explain how consumers behave in gamified environments (Seaborn and Fels 2015). While consumers' goals have long been known to affect their behavior, little had been known about whether gamifying financial platforms changes these goals.

Future Directions

Our research has limitations, which suggest directions for future research. First, the effects of gamification on financial risk taking are relatively small. In our studies, we manipulated gamification rather subtly by merely mentioning it or by engaging participants in a one-shot gamification task (Prentice and Miller 1992). Despite these subtle manipulations, some of our studies showed that gamification more than doubled financial risk taking—a substantial increase compared to the effect sizes observed for other contextual factors (e.g., financial resources; He et al. 2008). Nonetheless, further research could study whether the effect of gamification on financial risk taking increases in more longitudinal studies that require participants to engage more with game elements.

Another interesting line of future research could be to examine factors that may affect the link between the gamification of financial platforms and consumers' risk preferences. In particular, future research should further investigate whether situational variables, such as emotional states (Reimann et al. 2014) or life experiences (Netzer, Lemaire, and Herzstein 2019), and individual difference variables, such as general risk propensity (Sitkin and Weingart 1995),

sensation seeking (Wong and Carducci 1991), or emotion regulation (Rekar, Pahor, and Perat 2023), moderate the effect of gamification on financial risk taking.

Finally, future research could examine how gamified platforms should be designed to dissuade consumers from unhealthy levels of risk. These design questions can range from the naming of game elements (e.g., rookie vs. beginner level) or the development of in-app communications (e.g., warning messages) to choosing different environments (e.g., gamified vs. playful environments). While our research focuses on gamified design elements like leaderboards, future research could examine whether playful design elements such as game-like graphics (i.e., those that are less about winning and more about making environments visually appealing) have a similar effect on consumers. Indeed, aesthetic design elements are inherently rewarding (Reimann et al. 2010) and thus can lead to irrational decisions (Townsend and Shu 2010). Analogously, future research could examine whether the effect of gamification on financial risk taking depends on whether the game specifies a concrete goal. In most of our studies (except study 1), participants saw how others performed and thus knew the financial amount they would win the game with. Future research could study whether the effect of gamification attenuates when other players' performances and the amount needed to win the game are not disclosed.

Substantive Implications

Our research has implications for consumers, financial institutions, and policymakers. If executed correctly, gamifying financial platforms can help consumers better prepare for their future. For example, investing in the stock market has become more important than ever, especially in economies in which interest rates on savings accounts remain low and provide consumers with little to no return (Adamczyk 2022). Despite this, only about 58% of US consumers have invested in financial markets, and this percentage is even lower for young, low-income, and minority consumers (Saad and Jones 2022). Gamification might overcome consumers' risk aversion and nudge them to adopt investment platforms, thereby gaining more knowledge about financial markets and potentially improving their financial well-being. However, consumers with addiction potential should be wary of these platforms, as gamification may also lead to gambling-like behavior.

The effect of gamification on consumers' financial well-being largely depends on how financial firms gamify their platforms. We advise financial institutions to be transpar-

ent and fair when adding game elements to their platforms. At a minimum, this should include disclosing how game mechanisms work and offering different ways for consumers to win the game (especially ways that do not require taking financial risk). For example, instead of creating levels or leaderboards that rank consumers higher when they invest a higher volume or earn more money, financial institutions could also create game elements that reward consumers for reading more financial reports or spending more time researching investment options. This may benefit financial institutions in the long run, as better-educated consumers are more likely to invest in the future. Besides, consumers also benefit from improving their financial literacy as it guides them to make more rational investment decisions (Yin and Yang 2022).

Finally, policymakers are responsible for monitoring gamification. Their goal should be to weigh the interests of financial institutions against the interests of consumers. It is not in the interest of financial institutions when consumers use their gamified investment platforms as gambling tools. It is also not in the interest of consumers when gamified platforms contribute to America's growing gambling problem. It is in everyone's interest that gamified platforms are regulated to prevent financial decisions from becoming gambling decisions. Thus, policymakers should raise awareness about the potential dangers of gamification in finance. While warning messages on gambling platforms (e.g., online casinos) have long been the norm, these messages are typically found in footnotes or separate links within investment platforms, a practice that policymakers could change in the future.

Gamified financial platforms will have a future only if policymakers succeed in creating win-win situations for financial institutions and consumers. We hope that our research represents an important step toward creating these win-win situations.

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