

Financial Deception: A Deeper Cut than Simple Loss?

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Abstract

We provide evidence that the *way* investors lose money affects their overall utility. Using survey data, we show that monetary losses due to fraud cause more distress than equivalent losses due to bad luck or poor investment decisions. This heightened pain seems to stem from stronger feelings of betrayal and internal embarrassment. We calibrate a utility model to quantify the importance of this fraud aversion. Substantial risk-premiums are required to overcome fraud aversion and induce stock market participation.

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1 Introduction

Traditional economic theory assumes that utility is a function of consumption or wealth. Investors' happiness does not depend on the *source* of the underlying wealth level. Recent work challenges this assumption by highlighting the role of nonpecuniary preferences. For example, there is growing evidence that ESG preferences influence investment decisions. Pastor et al. (2021) construct a model in which green assets earn lower expected returns in equilibrium because investors derive utility from investing in green stocks and disutility from investing in brown stocks. Consistent with this model, Hong and Kacperczyk (2009) show that sin stocks have historically earned higher returns and Barber et al. (2021) show that venture capital funds pursuing social impact underperform more traditional VC funds. Outside of ESG preferences, Fleckenstein and Longstaff (2023) provide evidence of taxation disutility - investors appear willing to sacrifice returns to avoid paying taxes.

Building on these works, we highlight a distinct dimension of nonpecuniary preferences: how the source of a financial loss affects investor utility. We hypothesize that losses from fraud are more painful than equivalent losses from other sources. This perspective connects to Guiso et al. (2008), which highlights the importance of trust for stock market participation. The paper considers a portfolio allocation problem between a risky asset and a risk-free asset. Investors assign some probability to being cheated - if cheated, the investor loses all money allocated to the risky asset. To induce stock market participation, this perceived probability must be sufficiently low. Subsequent work provides evidence for this framework: Giannetti and Wang (2016) and Gurun et al. (2018) use the revelation of fraud as a shock to trust levels and show that this shock reduces allocations to risky assets. We argue that this framework understates the true impact of fraud on investment because it omits the nonmonetary costs of fraud. There is evidence that the nonmonetary costs borne by fraud victims are significant. A report prepared for the FINRA Investor Education Foundation found that half of fraud victims reported feeling serious stress as a result of the fraudulent incident and 35% reported depression (Applied Research and Consulting LLC (2015)). Of

course, it is possible that the nonmonetary costs of losses due to nonfraud sources would be similar. We run surveys to compare the nonmonetary costs of losses from fraud with the nonmonetary costs of losses from non-fraud sources.

In our first survey, we ask subjects to compare hypothetical investment losses that vary in source. In one scenario, the loss is due to fraud. In the alternative scenario, the loss is attributed to either poor, but non-fraudulent, investment decisions by the firm, poor, but non-fraudulent, investment decisions by your investment adviser or a natural disaster. The responses overwhelmingly imply that losses due to fraud are more painful than losses due to other sources. For example, when comparing a 20% loss due to accounting fraud with a 20% loss due to a natural disaster, 100 respondents report that the loss due to accounting fraud would make them more sad, while only 14 report that losses due to the natural disaster would make them more sad (25 report indifference). When comparing losses due to fraud by your financial adviser with equivalent losses due to poor, but non-fraudulent, decisions by your financial adviser, the results are more pronounced. 122 respondents report that the loss due to fraud would make them more sad whereas only 6 report that losses due to non-fraudulent decisions would make them more sad (11 report indifference). These findings strongly support our hypothesis that losses due to fraud sources are more painful than losses due to non-fraud sources.

In a second survey, we ask respondents open-ended questions to better understand why losses from fraud are more painful than losses from non-fraud sources. Common emotions evoked by the fraud scenario include anger, betrayal, frustration and sadness. Some tie losses from fraud to exploitation by more powerful agents. 87% of respondents attribute their emotions, at least in part, to external sources. About 38% also connect the pain from fraud losses to internal sources - losses from fraud are seen as more avoidable, which seems to induce feelings of embarrassment and frustration.

We use survey questions and a model to quantify this pain. Our model extends the framework of Guiso et al. (2008) - we extend their model by assuming there is a utility cost

to losses attributed to fraud. This cost is governed by a parameter γ_2 , which constitutes our measure of fraud aversion. When $\gamma_2 = 0$, our framework reduces to the model used by Guiso et al. (2008). To estimate γ_2 , we use survey questions that solicit indifference points from respondents. For example, we ask respondents to identify the percentage loss due to non-fraud sources that would feel just as painful as a 20% loss attributed to fraud. We can then determine the risk-premium required to invest a non-zero amount in the risky asset for different levels of γ_2 . When there is no fraud aversion, the risk-premium required for investment in the risky asset is about 1%. However, when we use our median estimate of fraud aversion the required equity premium jumps to over 15%. This suggests that aversion to fraud may be a strong deterrent for stock market investment.

Most generally, as noted above, our work contributes to the literature on nonpecuniary preferences among investors (Hong and Kacperczyk (2009); Hartzmark and Sussman (2019); Fleckenstein and Longstaff (2023)). Our study also contributes to the fraud literature by emphasizing a channel that has received little attention: the psychological costs borne by investors. Much of the prior literature focuses on the economic effects of fraud and financial misreporting on firm value (e.g. Karpoff et al. (2008) and Dechow et al. (1996)), market-wide trust (e.g. Giannetti and Wang (2016)), or on reputational penalties (Alexander (1999)). We complement these studies by highlighting the unique psychological pain that stems from losses attributed to fraud. Extending the model from Guiso et al. (2008), we highlight why this pain is important and may contribute to our understanding of nonparticipation (e.g. Haliassos and Bertaut (1995) and Guiso et al. (2008)) or investment in dividend stocks (Kapons et al. (2023)).

Finally, our study also highlights the importance of fraud prevention and early detection. By showing that the nonmonetary costs of fraud can be quite large, we’re identifying a potential source of the demand for high quality audits and early detection. For example, fraud aversion may contribute to our understanding of the strong demand for reputable (Skinner and Srinivasan (2012)) and independent (Mayhew and Pike (2004)) audits among

investors. Our work underscores the importance of auditing by highlighting a nonmonetary channel that adds to the importance of audit quality for investor confidence/behavior (Francis (2004)).

2 Simple Framework

We start with the assumption that an aversion to being defrauded can distort investment decisions.

Propositions: For a sufficiently high aversion to being defrauded, agents will not participate in a risky asset if they perceive any risk to being defrauded.

We assume that people have an aversion to being defrauded above and beyond any monetary loss. We can model this by considering a utility maximization problem. The agent's utility is defined by two parameters: overall wealth, W , and loss from being defrauded, L . Explicitly, we define U as:

$$U(W, L) = -e^{-2\gamma_1 W} - e^{-2\gamma_2 L}, \quad (1)$$

where $\gamma_1 > 0$ captures risk-aversion and $\gamma_2 \geq 0$ captures additional aversion to losses from fraud. When $\gamma_2 = 0$, there is no additional aversion to losses from fraud. We assume that there are two assets. The first asset is a safe asset (e.g. treasuries) that yields a certain gross return r_f . The second asset is a risky asset. Without any cheating, the asset has an uncertain return $\hat{r}_1$, with normally distributed returns characterized by mean return $\bar{r}_1$ and variance σ_1^2 . p is the perceived probability of being cheated. If the investor is being cheated, then we assume that the risky asset follows a return pattern $\hat{r}_2$, where $\hat{r}_2 = \hat{r}_1 - b$ and b is a positive constant. For initial wealth W , the maximization problem is

$$\max_{\alpha} (1 - p) * E[-e^{-2\gamma_1(\alpha\hat{r}_1 W + (1-\alpha)r_f W)} - 1] + pE[-e^{-2\gamma_1(\alpha\hat{r}_2 W + (1-\alpha)r_f W)} - e^{2\gamma_2 \alpha W b}].$$

$\hat{r}_1, \hat{r}_2$ are both normally distributed with respective means $\bar{r}_1, \bar{r}_2 = \bar{r}_1 - b$, and variance σ_1^2 . This suggests that wealth is normally distributed. From the moment generating function for the normal distribution, we know that this maximization problem is equivalent to:

$$\max_{\alpha} (1 - p) * \left(-e^{-2\gamma_1(W(\alpha\bar{r}_1 + (1-\alpha)r_f)) + 2\gamma_1^2(W^2\alpha^2\sigma_1^2)} - 1 \right) + \quad (2)$$

$$p \left(-e^{-2\gamma_1(W(\alpha(r_2^-) + (1-\alpha)r_f)) + 2\gamma_1^2(W^2\alpha^2\sigma_1^2)} - e^{2\gamma_2\alpha Wb} \right).$$

Let us refer to α^* as the optimal allocation of wealth to the risky asset.

Define the optimal value from equation 2 with state variable γ_2 as $V(\gamma_2)$. Suppose that there is no value of γ_2 such that $\alpha^* = 0$. This implies that $\forall \gamma_2$,

$$V(\gamma_2) > \left(-e^{-2\gamma_1 W r_f} \right) - 1.$$

The RHS is finite. But, for $p > 0, \alpha > 0, W > 0, b > 0$, $V(\gamma_2)$ is unbounded (negatively). This suggests a contradiction. There is a sufficiently large aversion to being defrauded γ_2 for which the agent will not invest.

We plot how the optimal alpha changes with underlying parameters. For fixed parameters, we choose a risk-free rate of 3%, an expected risk premium of 5%, a standard deviation of 20%, an initial wealth of 1, a probability of fraud p equal to 3%, a risk aversion parameter, $\gamma_1 = 1, b = .25$, and a fraud aversion parameter, $\gamma_2 = 0.5$. Our estimates of p and b come from Dyck et al. (2024). The paper estimates that around 10 percent of all large public corporations commit securities fraud in a given year - with about 1/3rd of it detected. We use the conservative estimates from the 95th percentile confidence interval - It also estimates a cost to detected fraud of about 25 percent based on the findings in Karpoff et al. (2008).

We present the comparative statics from numerical optimization in Figures 1, 2 and 3. Figure 1 highlights, as expected, that the fraction invested in the risky asset crashes as the

perceived probability of fraud increases. This is in line with the findings of Guiso et al. (2008), which finds that stock market participation drastically decreases as the perceived probability of fraud increases. It is also consistent with Clor-Proell et al. (2023), which highlights that customer investors respond less negatively to restatements, which could be attributed in part to the fact that customers likely think fraud is less likely than non-customers. Holding all other parameters constant, as the aversion to being defrauded increases, we show that the optimal fraction allocated to the risky-asset decreases in Figure 2. Finally, in Figure 3, we show how allocation to the risky asset decreases as the penalty for fraud increases.

3 Data

We run an online survey to better understand people’s feelings in different scenarios. We use Connect, CloudResearch’s crowdsourcing platform, to run the survey. They identify high quality participants to mitigate the risk that people or computer programs answer randomly. We also use their platform’s filters to restrict our survey participants to individuals that claim to participate in household finances and have some investments outside of personal savings or checking accounts. This restriction serves as a way to restrict the sample to participants with some financial experience. We pay participants 3 dollars for completing the survey and we collect 150 survey responses. Of these respondents, we exclude participants who report that making money on an investment would make them sadder than losing money on an investment. The inclusion of these respondents would not affect our inferences.

After the initial survey, which provided evidence that deception exacerbates the pain from financial loss, we look to estimate this pain in our model. We again use Connect to run the survey and restrict our survey participants to individuals that claim to participate in household finances and have some investments outside of personal savings or checking accounts. We pay participants 4 dollars for completing the survey and we collect 203 survey responses.

4 Survey Results

4.1 Does the way you reach a monetary outcome matter?

In this section, we present the results from our online surveys. In our first survey, we ask participants to compare two scenarios with equivalent monetary outcomes. The key distinction is that in Situation A they're a victim of fraud, while in Situation B they are not. Survey respondents are asked to rate their happiness on a Likert scale, ranging from Situation A would make me extremely more sad to Situation B would make me extremely more sad. Specifically, we give them the following instructions:

“You will now be asked to answer five questions where you compare two scenarios, which will be labeled A and B. These scenarios will vary across questions. We will ask you to compare how each would affect your happiness by scoring any potential difference on a scale ranging from A would make me extremely more sad to B would make me extremely more sad. You can also answer “I don't understand,” if you do not understand either of the scenarios.

After answering the questions and clicking the arrow to continue, you will not be able to return to the questions.

In all of these hypothetical scenarios, please assume that you cannot recover any funds through a legal process.”

We compare how the survey responses differ from the indifference condition that situations A and B would affect me similarly. We use their rank on the Likert scale ranging from Situation A would make me extremely more sad=1 to Situation B would make me extremely more sad=7. We test whether the average response is statistically different from 4, which represents the indifference condition. In all four scenarios, we can reject the null hypothesis that situations A and B would affect respondents similarly.

In what follows, we present our survey results. We exclude the question that asks them to identify if making money would make them happier or sadder than losing money. This question is used to filter out respondents that are likely not reading the questions carefully.

The questions are presented in a randomized order, but we label them such that we can easily reference the questions in our discussion.

In Table 1, we present the results from a question asking respondents to rate their reaction to the following two scenarios:

Situation A: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about what you'd expect to earn in a month. You learn that the adviser did not make any investments and you lost money because they used your funds for personal expenditures.

Situation B: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about what you'd expect to earn in a month. You learn that the adviser made investments that they thought would perform well, but ultimately lost money.

We find an average response of about 1.77. The t-stat to test the difference from 4 is 20.34.

In Table 2, we present the results from a question asking respondents to rate their reaction to the following two scenarios:

Situation A: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one year, you learn that you earned a significant return on your investment. You gained about what you'd expect to earn from working for a

year. However, you also learn that you would have earned twice that, but your financial adviser stole half of your gains.

Situation B: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one year, you learn that you earned a significant return on your investment. You gained about what you'd expect to earn from working for a year.

We find an average response of about 1.73. The t-stat to test the difference from 4 is 19.93.

In Table 3, we present the results from a question asking respondents to rate their reaction to the following two scenarios:

Situation A: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after it is uncovered that the company engaged in accounting fraud and its accounting reports cannot be relied upon. Your assets are now worth about 20 percent less.

Situation B: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after the company reports that its most recent investments have proved to be unsuccessful. Your assets are now worth about 20 percent less.

We find an average response of about 2.65. The t-stat to test the difference from 4 is 9.66.

In Table 4, we present the results from a question asking respondents to rate their reaction to the following two scenarios:

Situation A: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after it is uncovered that the company engaged in accounting fraud and its accounting reports cannot be relied upon. Your assets are now worth about 20 percent less.

Situation B: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's and its competitors stock price plummets after a natural disaster disrupts operations. Your assets are now worth about 20 percent less.

We find an average response of about 2.51. The t-stat to test the difference from 4 is 10.77.

The results in these tables are strongly consistent with our prediction that deception exacerbates the pain from financial loss.

4.2 Why are monetary losses from deception more painful than equivalent monetary losses from other sources?

In a second survey, we ask to open-ended questions to better understand why investors find losses from deception more painful. The first open-ended question, we considered was:

When envisioning a monetary loss due to financial fraud, what emotions or thoughts come to mind?

After being prompted to state their emotions, the overwhelming majority (~97%) described negative emotions. The small proportion of respondents that did not express negative emotions had a neutral perception, stating that its part of the investment risk. The below image displays a word cloud that stems from extracting emotions from their responses. The top emotions expressed include sadness, betrayal, anger and frustration.



These emotions seem to stem from both internal and external sources. About reading the responses, we identify 62% as stemming exclusively from external sources, 13% as stemming exclusively from internal sources, and 25% as stemming from both internal and external sources. This suggests that 87% of individuals emotions stem - at least partially from external sources. This could help explain why auditors are judged harshly after audit failures with severe consequences even when the quality of audit was high (Kadous (2000)). This suggests that while a lot of investors will experience negative emotions that are directed towards the perpetrator of the fraud, a non-negligible fraction will also experience negative emotions based on their personal decision to invest. To more sharply distinguish between monetary losses due to fraud and monetary losses more generally, we ask an additional question:

What - if anything - makes losing money due to fraud different from losing an equivalent amount of money due to something unrelated to fraud (e.g. bad luck, a natural disaster, a decline in general economic conditions)?

Most respondents cite the cause of the loss as being relevant. Respondents consistently emphasized that fraud feels more painful and personal because it stems from intentional deceit. Unlike natural disasters, which are seen as uncontrollable events, fraud involves a breach of trust, where a company actively takes advantage of its shareholders. As one participant put it, "Losing money to just stupid fraud feels like a personal attack on me."

This sense of betrayal often leads to broader disillusionment, not just with the company but with the financial system as a whole. Some participants expressed how fraud damages their confidence in institutions and makes future investment decisions feel riskier. Others highlighted the preventability of fraud, viewing it as something that could have been noticed or stopped.

Several respondents also expressed self-blame, questioning their own judgment for trusting the company in the first place. One participant noted, “You would always question whether you could have seen any red flags before you lost your money to fraud.” Interestingly, some respondents brought up socioeconomic dynamics, suggesting that fraud deepens inequality or is part of a broader pattern of exploitation.¹

These extended answers suggest that the source of the monetary loss matters. In particular, respondents seem to think that losses from fraud feel more like a personal attack than losses from non-fraud sources. Losses from fraud seem to commonly induce negative emotions like betrayal, anger, frustration and sadness. Interestingly - given that fraud can be hard to detect - a non-negligible fraction of respondents also highlight negative emotions from internal sources: they would regret their decision to invest and may feel embarrassment. This hints at potential long lasting effects of fraud.

4.3 Quantifying the additional pain due to deception

In the second survey, we use questions to quantify the fraud. Specifically, we ask respondents to identify the percentage loss from non-fraud sources that would cause equivalent pain to losses from fraud sources. The answers to these questions help us estimate the λ_2 parameter, or the parameter measuring aversion to fraud, in our model. To estimate our model, we start with equation 1:

$$U(W, L) = -e^{-2\gamma_1 W} - e^{-2\gamma_2 L},$$

¹For example, one respondent noted: “Rich people are already profiting off pain; finding out they are doubling up on that makes me want to make a kerosene cocktail.”

and ask survey respondents for their indifference points. Namely, we ask respondents to name the percentage loss from non-fraud sources that would cause equivalent pain to losses from fraud sources. This indifference condition identifies the point for which happiness from a non-fraud loss equals happiness from a loss due to fraud:

$$-e^{-2\gamma_1 W(1-L_{nf})} = -e^{-2\gamma_1 W(1-L_f)} - e^{-2\gamma_2 W(L_f)}. \quad (3)$$

L_f and L_{nf} are the percentage losses (expressed as a decimal) where the agent is indifferent between a loss from fraud and a loss from no fraud. Solving for γ_2 , we see that:

$$\gamma_2 = -\frac{1}{2WL_f} * \ln \left(e^{-2\gamma_1 W(1-L_{nf})} - e^{-2\gamma_1 W(1-L_f)} \right).$$

As in our initial estimation, we assume $W = 1, \gamma_1 = 1$. Therefore, we can express γ_2 as:

$$\gamma_2 = -\frac{1}{2L_f} * \ln \left(e^{2L_{nf}-2} - e^{2L_f-2} \right).$$

Note that γ_2 will be undefined if $L_f > L_{nf}$. Additionally, if $L_{nf} = L_f$, then $\gamma_2 = 0$.

We use survey questions to estimate γ_2 . Each survey participant answers 5 questions. Before each question, subjects are asked to use a slider to select a value of X that would make scenarios A and B equally painful. The questions are put into random order. One comparison of scenarios is:

Scenario A: You invest in a company after a strong earnings report. Later, it is revealed that the company engaged in accounting fraud and this results in your investment falling by 10%.

Scenario B: You invest in a company after a strong earnings report. Later, it is revealed that the company's recent investments proved to be unsuccessful. Your investment is now worth about X percent less.

A second comparison of scenarios is:

Scenario A: You invest in a company after a strong earnings report. Later, it is revealed that the company's recent investments proved to be unsuccessful. The value of your investment falls by 25%.

Scenario B: You invest in a company after a strong earnings report. Later, it is revealed that the company engaged in accounting fraud. This results in your investment decreasing in value. Your investment is now worth about X percent less.

Another comparison consists of these two scenarios:

Scenario A: You invest in a company after a strong earnings report. Later, it is revealed that the company engaged in accounting fraud and this results in your investment falling by 20%.

Scenario B: You invest in a company after a strong earnings report. Later, it is revealed that the company's recent investments proved to be unsuccessful. Your investment is now worth about X percent less.

Another scenario comparison is:

Scenario A: You invest in a company after a strong earnings report. Later, it is revealed that the company engaged in accounting fraud and this results in your investment falling by 20%.

Scenario B: You invest in a company after a strong earnings report. Unfortunately, uncontrollable factors (e.g. natural disasters, general market downturn) resulted in a fall of the company's stock price. Your investment is now worth about X percent less.

The final scenario comparison for which we solicit an indifference point is:

Situation A: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about 20% of your investment. You learn that the adviser did not make any investments and you lost money because they used your funds for personal expenditures.

Situation B: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about $X\%$ of your investment. You learn that the adviser made investments that they thought would perform well, but ultimately lost money.

For each question, we can estimate γ_2 . Thus, for each individual, we can estimate a median γ_2 estimate across their question answers. We treat observations with $L_f > L_{nf}$, as observations where $\gamma_2 = -\infty$. Of these less than 5% of our survey participants have a median $\gamma_2 < 0$. For these participants, their answers suggest that losing money due to fraud is less painful than losing money due to non-fraud sources. The remaining survey participants have a median $\gamma_2 \geq 0$. Of these, the median of the median individual-specific estimates for $\gamma_2 = 2.45$.

We also consider an estimation where we treat observations with $L_f > L_{nf}$, as missing observations. From this, we can estimate the mean γ_2 estimate for each individual.² Across individuals the average of these means equals 5.25.

In Figure 4, we show how optimal investment in the risky asset changes with the expected return on the risky asset for different fraud aversion parameters. When we assume that $\gamma_2 = 0$, or no distinction is made between losses derived from fraud versus equivalent losses derived from non-fraud sources, we find that the risk-premium required for non-zero investment in the risky asset is about 1%. When we use the median value computed above, we see that a risk-premium of over 15% is required for stock market participation. When we use the mean estimate, we see that an equity risk-premium of over 30% is required for stock market participation. This suggests that fraud aversion may lend additional insight into non-participation in equity markets. While not explicitly modeled, our results may also offer insight into risky asset allocation: If investors perceive different stocks as having different likelihoods of fraud, those with high levels of fraud aversion may turn towards stocks with a

²Less than one percent of survey respondents will have missing observations for each question.

low perceived risk of fraud (e.g. dividend stocks and Kapons et al. (2023)).

5 Conclusion

We underscore the importance of the nonpecuniary costs of financial fraud. Analyzing survey data, we find strong evidence that losses attributed to financial fraud cause more distress than losses from non-fraud sources. This aversion may be a strong deterrent to investing in assets with a perceived fraud risk. For example, when we calibrate our utility model, we find that an equity risk-premium of over 15% is required to induce stock market participation among those with the median level of fraud aversion. As such, our results may shed light on nonparticipation in equity markets (Haliassos and Bertaut (1995)). They also highlight the importance of high quality audits to mitigate psychological pain and minimize how much potential fraud deters investment.

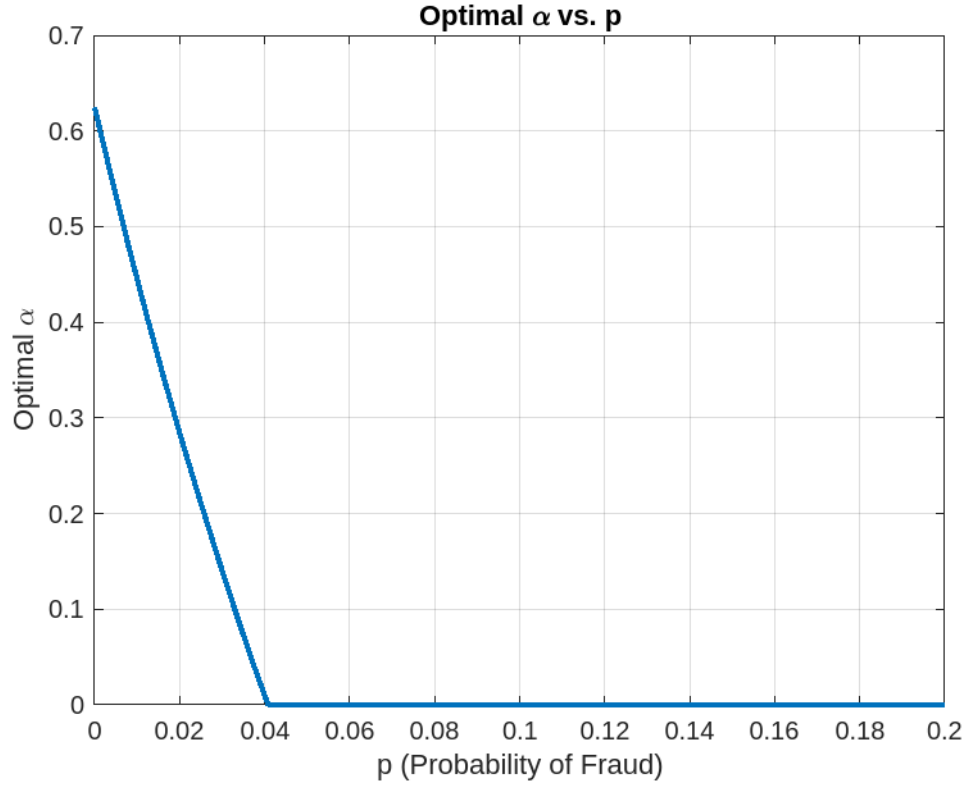
Future work may look at the impact of this for risky asset allocation. Kapons et al. (2023) provide evidence that dividend-paying stocks are perceived as less likely to commit fraud. This could drive individuals with a high level of fraud aversion into dividend paying stocks. Future work could also look the determinants of variation in fraud aversion - this could offer insight into when/where auditing systems are most important.

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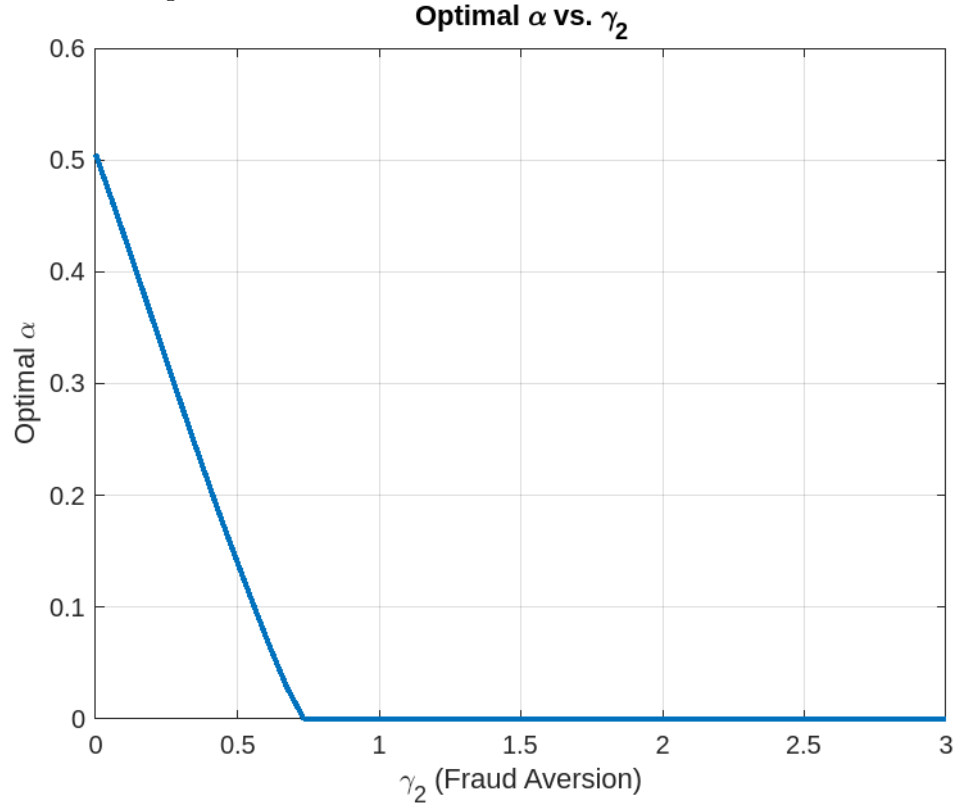
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Figure 1: Optimal Investment with the Probability of Fraud



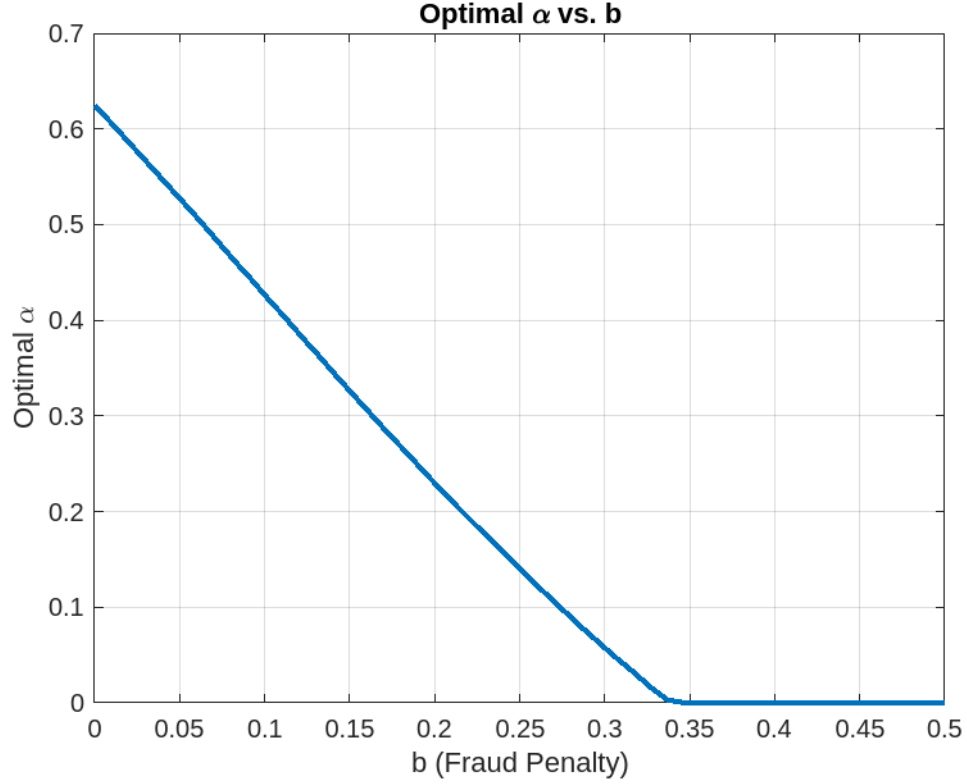
We plot how the optimal allocation to the risky asset changes with the probability of fraud in our model. For fixed parameters, we choose a risk-free rate of 3%, an expected risk premium of 5%, a standard deviation of 20%, an initial wealth of 1, a risk aversion parameter, $\gamma_1 = 1$, $b = .25$, and a fraud aversion parameter, $\gamma_2 = 0.5$.

Figure 2: Optimal Investment with Fraud Aversion



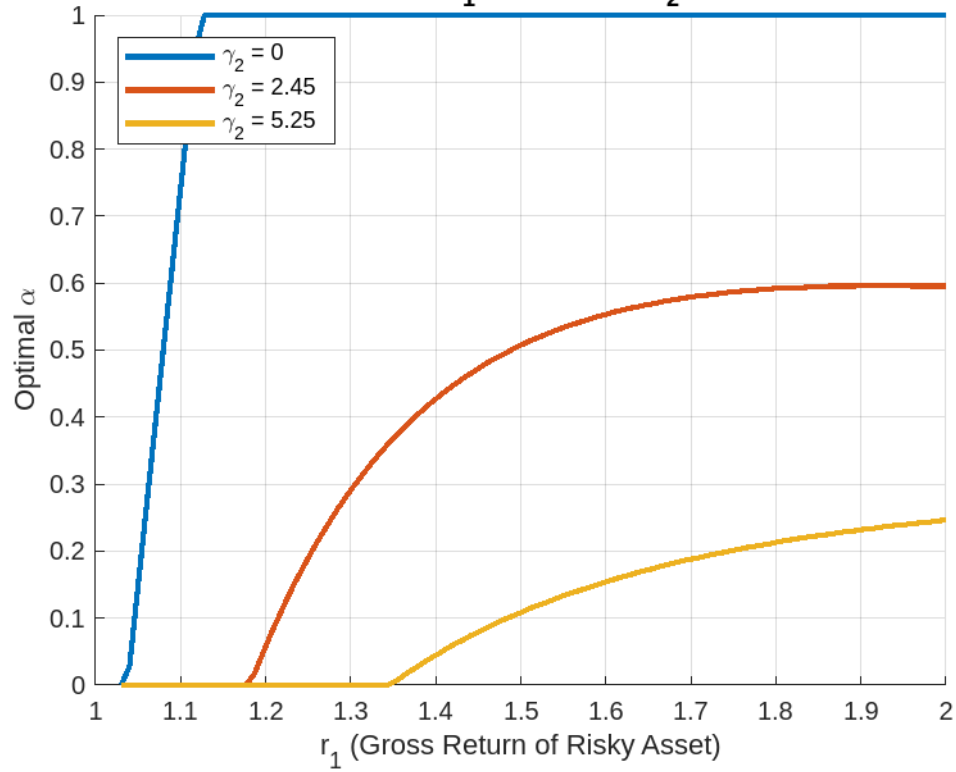
We plot how the optimal allocation to the risky asset changes with the fraud aversion parameter in our model. For fixed parameters, we choose a risk-free rate of 3%, an expected risk premium of 5%, a standard deviation of 20%, an initial wealth of 1, a probability of fraud, $p = 0.03$, $b = .25$, and a risk-aversion parameter, $\gamma_1 = 1$.

Figure 3: Optimal Investment with Losses from Fraud



We plot how the optimal allocation to the risky asset changes with the penalty from fraud in our model. For fixed parameters, we choose a risk-free rate of 3%, an expected risk premium of 5%, a standard deviation of 20%, an initial wealth of 1, a probability of fraud p equal to 3%, a risk aversion parameter, $\gamma_1 = 1$, and a fraud aversion parameter, $\gamma_2 = 0.5$.

Figure 4: Optimal Investment with Risky Asset Return
Optimal α vs. r_1 for Different γ_2 Values



We plot the optimal investment into the risky asset as the expected gross return on the risky asset changes. The blue line plots the relationship for $\gamma = 0$, the red line plots the relationship for $\gamma_2 = 2.45$ and the yellow line plots the relationship for $\gamma_2 = 5.25$.

Table 1: Question 1: Financial Adviser Fraud Loss

Survey respondents are presented with two scenarios and told to select the choice that best reflects how they envision each affecting their happiness. The situations presented are:

Situation A: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about what you'd expect to earn in a month. You learn that the adviser did not make any investments and you lost money because they used your funds for personal expenditures.

Situation B: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one month, the adviser notifies you that the investment performed poorly and you lost about what you'd expect to earn in a month. You learn that the adviser made investments that they thought would perform well, but ultimately lost money.

Feelings	Number of Survey Respondents
A would make me extremely more sad	86
A would make me moderately more sad	28
A would make me slightly more sad	8
A and B would affect me similarly	11
B would make me slightly more sad	2
B would make me moderately more sad	2
B would make me extremely more sad	2
I don't understand the scenarios	0

Table 2: Question 2: Financial Adviser Fraud Gain

Survey respondents are presented with two scenarios and told to select the choice that best reflects how they envision each affecting their happiness. The situations presented are:

Situation A: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one year, you learn that you earned a significant return on your investment. You gained about what you'd expect to earn from working for a year. However, you also learn that you would have earned twice that, but your financial adviser stole half of your gains.

Situation B: You speak to a financial adviser. They offer to invest your retirement assets in stocks they believe are good investments for a small fee. You decide to invest with the adviser and pay the small fee. After one year, you learn that you earned a significant return on your investment. You gained about what you'd expect to earn from working for a year.

Feelings	Number of Survey Respondents
A would make me extremely more sad	94
A would make me moderately more sad	21
A would make me slightly more sad	7
A and B would affect me similarly	9
B would make me slightly more sad	2
B would make me moderately more sad	5
B would make me extremely more sad	1
I don't understand the scenarios	0

Table 3: Question 3: Company Fraud v. Poor Investments

Survey respondents are presented with two scenarios and told to select the choice that best reflects how they envision each affecting their happiness. The situations presented are:

Situation A: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after it is uncovered that the company engaged in accounting fraud and its accounting reports cannot be relied upon. Your assets are now worth about 20 percent less.

Situation B: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after the company reports that its most recent investments have proved to be unsuccessful. Your assets are now worth about 20 percent less.

Feelings	Number of Survey Respondents
A would make me extremely more sad	43
A would make me moderately more sad	38
A would make me slightly more sad	13
A and B would affect me similarly	33
B would make me slightly more sad	0
B would make me moderately more sad	6
B would make me extremely more sad	6
I don't understand the scenarios	0

Table 4: Question 4: Company Fraud v. Natural Disaster

Survey respondents are presented with two scenarios and told to select the choice that best reflects how they envision each affecting their happiness. The situations presented are:

Situation A: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's stock price plummets after it is uncovered that the company engaged in accounting fraud and its accounting reports cannot be relied upon. Your assets are now worth about 20 percent less.

Situation B: After an impressive earnings announcement for a company, you invest your retirement assets in that company. Later in the quarter, the company's and its competitors stock price plummets after a natural disaster disrupts operations. Your assets are now worth about 20 percent less.

Feelings	Number of Survey Respondents
A would make me extremely more sad	51
A would make me moderately more sad	34
A would make me slightly more sad	15
A and B would affect me similarly	25
B would make me slightly more sad	2
B would make me moderately more sad	9
B would make me extremely more sad	3
I don't understand the scenarios	0