**Appendix**

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APPENDIX A - FINANCIAL LITERACY QUESTIONAIRE

Correct answers are in *italic*.

Items 1-7 were the ones used to test the financial literacy of U.S. Business School students (see General Discussion)

Items 1-5 : (Volpe, Kotel, & Chen, 2002); Item 6: (Mandell, 2008); Item 7: Self-created; Item 8-9: (Lusardi & Mitchell, 2011); Items 10-19: (Fernandes, Lynch, & Netemeyer, 2014)

Fernandes, D., Lynch, J. G., & Netemeyer, R. G. (2014). Financial Literacy, Financial Education, and Downstream Financial Behaviors. *Management Science, 60*(8), 1861-1883.

Lusardi, A., & Mitchell, O. S. (2011). Financial literacy and planning: Implications for retirement wellbeing: National Bureau of Economic Research.

Mandell, L. W. (2008). The Financial Literacy of Young American Adults: Results of the 2008 National Jump$tart Coalition Survey of High School Seniors and College Students. from <http://www.jumpstart.org/assets/files/2008SurveyBook.pdf>

Volpe, R. P., Kotel, J. E., & Chen, H. (2002). A Survey of Investment Literacy among Online Investors. *Financial Counseling and Planning, 13*(1), 1-13.

(1) A distribution from a mutual fund reduces its net asset value (NAV) by:

* *the entire amount of the distribution*
* the amount of the distribution less capital gain
* the amount of the distribution less capital inflows
* a distribution does not reduce the NAV
* I don't know

(2) An investment of $1000 compounded annually at an interest rate of 10 % for 10 years will be worth:

* *more than $2000 at the end of the 10 years*
* less than $2000 at the end of the 10 years
* exactly $2000 at the end of the 10 years
* It cannot be determined using this information
* I don't know

(3) Consider the following companies and their betas. Which stock will underperform the others when the stock market rises by 10%:

* Blue Company Beta = 0.85
* Orange Company Beta = 1.05
* *Purple Company Beta = -1.10*
* Gold Company Beta = -0.95
* I don't know

(4) A long-term debt-equity ratio that might signal a greater financial leverage risk is:

* 0.09
* 0.6
* 1.5
* 2.4
* *3.3*
* I don't know

(5) As interest rates rise, the price of bonds:

* rises
* *falls*
* stays the same
* it cannot be determined using this information
* I don't know

 (6) Which group would have the greatest problem during periods of high inflation that last several years?

* Older, working couples saving for retirement.
* *Older people living on fixed retirement income.*
* Young couples with no children who both work.
* Young working couples with children.
* I don't know

(7) As interest rates rise, the price of stocks:

* rises
* falls
* stays the same
* *it cannot be determined using this information*
* I don't know

(8) Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After 1 year, would you be able to buy:

* more than today with the money in this account
* exactly the same as today with the money in this account
* *less than today with the money in this account*
* I don't know

(9) Do you think that the following statement is true or false? “Bonds are normally riskier than stocks.”

* True
* *False*
* I don't know

(10) Considering a long time period (for example 10 or 20 years), which asset described below normally gives the highest return?

* savings accounts
* *stocks*
* bonds
* I don't know

(11) Normally, which asset described below displays the highest fluctuations over time?

* savings accounts
* *stocks*
* bonds
* I don't know

(12) Do you think that the following statement is true or false? “If you were to invest $1,000 in a stock mutual fund, it would be possible to have less than $1,000 when you withdraw your money.”

* *True*
* False
* I don't know

(13) Do you think that the following statement is true or false? “A stock mutual fund combines the money of many investors to buy a variety of stocks.”

* *True*
* False
* I don't know

(14) Do you think that the following statement is true or false? “After age 70 1/2, you have to withdraw at least some money from your 401(k) plan or IRA.”

* *True*
* False
* It depends on the type of IRA and/or 401(k) plan
* I don't know

(15) Do you think that the following statement is true or false? “A 15-year mortgage typically requires higher monthly payments than a 30-year mortgage, but the total interest paid over the life of the loan will be less.”

* *True*
* False
* I don't know

(16) Suppose you had $100 in a savings account and the interest rate is 20% per year and you never withdraw money or interest payments. After 5 years, how much would you have on this account in total?

* *More than $200*
* Exactly $200
* Less than $200
* I don't know

(17) Which of the following statements is correct?

* Once one invests in a mutual fund, one cannot withdraw the money in the first year
* *Mutual funds can invest in several assets, for example invest in both stocks and bonds*
* Mutual funds pay a guaranteed rate of return which depends on their past performance
* None of the above
* I don't know

(18) Which of the following statements is correct? If somebody buys a bond of firm B:

* He owns a part of firm B
* *He has lent money to firm B*
* He is liable for firm B’s debts
* None of the above
* I don't know

(19) Suppose you owe $3,000 on your credit card. You pay a minimum payment of $30 each month. At an Annual Percentage Rate of 12% (or 1% per month), how many years would it take to eliminate your credit card debt if you made no additional new charges?

* less than 5 years
* between 5 and 10 years
* between 10 and 15 years
* *never*
* I don't know

(Attention Check) Which activity is the riskiest?

* Leaving all your money in a savings account
* Investing your money in trusted mutual funds
* *Gambling all your money at a casino*
* I don’t know

APPENDIX B – TABLES OF PAST RETURNS (STUDIES 2-4)

***STUDIES 2 & 3***

**Sequential Choice Condition (Study 2 only)**

*Version A *

*Version B* 

**Simultaneous Choice Condition (Studies 2 and 3)**

*Version A* 

*Version B*

***STUDY 4***

**Control Condition**

*Version A *

*Version B *

**Portfolio Returns Condition**

*Version A *

*Version B *

***Replication of Study 4 without financial Incentive (see Appendix H)***

**Control Condition**

*Version A* 

*Version B *

**Portfolio Returns Condition**

*Version A* 

*Version B *

APPENDIX C - FULL SURVEYS (STUDIES 1-5)

Each new online page of the survey is preceded by \*\*\*

***STUDY 1***

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

PLEASE TAKE YOUR TIME TO READ THIS SCENARIO, AND ANSWER THE QUESTION BELOW (you will be able to move to the next page in about 1 minute).

Please imagine that you have invested some of your savings in one mutual fund. You are considering investing in a second fund, and you hesitate between two funds: fund Omega, and fund Epsilon. You want to invest for the long term.

Both funds Omega and Epsilon are managed by reputable firms, and in the long run, have yielded equally satisfying returns. There is however one key distinction between these two funds:

* **In the past, fund Omega has tended to perform very similarly to the fund you already have**: yielding positive returns when your fund also yielded positive returns, and yielding negative returns when your fund also yielded negative returns.
* **In contrast, fund Epsilon has tended to perform quite differently from the fund you already have**: yielding positive returns when your fund yielded negative returns, and yielding negative returns when your fund yielded positive returns.

Which fund would you invest in? Please remember that you want to invest for the long term.

* Omega
* Epsilon

\*\*\*

*[Scenario appears again]*

You have chosen the fund *[chosen fund].* Please try to explain your choice in a few sentences in the box below.

*[Textbox]*

\*\*\*

*[Scenario appears again]*

*[All items below rated on a 5-point scale ranging from “Definitely false” to “Definitely true”]*

Please answer the questions below, about fund Omega

Investing in Omega would...

* ...increase the chance that my overall investment loses money in the long run
* ...increase the chance that my overall investment makes money in the long run
* ...increase the fluctuations of my overall investment (meaning moving up and down widely)
* ...increase the chance that my overall investment yields stable returns
* ...make the returns of my overall investment easier to monitor
* ...make the returns of my overall investment easier to predict

Please answer the questions below, about fund Epsilon

Investing in Epsilon would...

* ...increase the risk that my overall investment loses money in the long run
* ...increase the chance that my overall investment makes money in the long run
* ...increase the fluctuations of my overall investment (meaning moving up and down widely)
* ...increase the chance that my overall investment yields stable returns
* ...make the returns of my overall investment easier to monitor
* ...make the returns of my overall investment easier to predict

\*\*\*

Do you personally invest in financial markets (bonds, stocks, mutual funds...)

* Yes, I manage personally my assets
* No, I have assets in financial markets but they are managed by a professional
* No, I don't have assets in financial markets.

How would you evaluate your knowledge of financial investment? *[7-point scale ranging from Very poor to Very good]*

\*\*\*

*[19 item financial literacy questionnaire on 19 separate pages, in random order. See Appendix A]*

\*\*\*

In what year were you born *[textbox]*

What is your gender?

* Male
* Female
* Other/Rather not say

What is your nationality?

* American (U.S.)
* Other (please specify) *[textbox]*

Language spoken at home

* English
* Other (please specify) *[textbox]*

***STUDY 2***

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

*[Sequential Choice Condition only]*

Please imagine that you inherited one mutual fund (Gamma) from a family member. You will find below the performance of this fund over the past 7 years.

*[Here: First line—Gamma—of the “Sequential Choice” table presented in Appendix B; Participants are randomly shown Version A or B]*

\*\*\*

*[Sequential Choice Condition only]*

Please take a minute to read this scenario and look at the graphs. Please read everything carefully.

Now please imagine that you also inherited some cash, and **you want to invest that money in a second mutual fund (in addition to Gamma).** You have a long-term investment horizon (**y**ou want to keep your two funds for at least 10 years).

**You have narrowed down your selection to two funds, both offered by investment firms with a solid reputation**: Epsilon, and Sigma. Both funds have yielded satisfying returns in the past, but there is a key distinction between these funds (as shown in the figures below):

* **In the past, Gamma (the fund you own) and Epsilon have tended to perform very similarly**: yielding positive returns at the same time, and negative returns at the same time.
* **In the past, Gamma (the fund you own) and Sigma have tended to perform quite differently** : When Gamma yielded positive returns, Sigma yielded negative returns. When Gamma yielded negative returns, Sigma yielded positive returns.

*[Here: “Sequential Choice” table presented in Appendix B; Participants are randomly shown Version A or B]*

In which two funds would you prefer being invested in ?

* Definitely Gamma & Epsilon
* Rather Gamma & Epsilon
* I'm indifferent
* Rather Gamma & Sigma
* Definitely Gamma & Sigma

\*\*\*

*[Simultaneous Choice Condition only]*

Please take a minute to read this scenario and look at the graphs. Please read everything carefully.

Imagine that you inherited money from a family member. **You want to invest that money in two mutual funds**, and you have a long-term investment horizon (**y**ou want to keep your two funds for at least 10 years).

**You have narrowed down your selection to three funds, all offered by investment firms with a solid reputation**: Gamma, Epsilon, and Sigma. Although all funds have yielded satisfying returns in the past, there is a key distinction between these funds (as shown in the table below):

* **In the past, Gamma and Epsilon have tended to perform very similarly**: yielding positive returns at the same time, and negative returns at the same time.
* **In the past, Gamma and Sigma have tended to perform quite differently** : When Gamma yielded positive returns, Sigma yielded negative returns. When Gamma yielded negative returns, Sigma yielded positive returns.

*[Here: “Simultaneous Choice” table presented in Appendix B; Participants are randomly shown Version A or B]*

In which two funds would you prefer being invested in ?

* Definitely Gamma & Epsilon
* Rather Gamma & Epsilon
* I'm indifferent
* Rather Gamma & Sigma
* Definitely Gamma & Sigma

\*\*\*

*[From now on: all conditions]*

The next questions ask you to compare a portfolio including **Gamma and Epsilon**, and a portfolio including **Gamma and Sigma.**

\*\*\*

*[All the following pages are presented in random order. On each of those pages, we showed again the table of past returns shown at the beginning of the questionnaire. For each question, participants answer on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Gamma-Sigma”, “Definitely Gamma-Sigma” ]*

* Which portfolio seems **riskier**?
* Which portfolio seems **safer**?
* Which portfolio seems **more dangerous**?

\*\*\*

* Which portfolio is likely to **fluctuate more over time** (meaning sharply moving up and down)

\*\*\*

* Which portfolio would be **easier to track**?
* Which portfolio would be **more complicated to track**?
* Which portfolio would be **more confusing**?

\*\*\*

* Which portfolio would it be **easier to get familiar with**?
* Which portfolio would it be easier to **get used to?”**
* Which portfolio would it be easierto **get accustomed to**?

\*\*\*

* Which portfolio would have **more predictable future performances**?
* Which portfolio makes you feel **more certain about future performances**?
* With which portfolio would you **know better what to expect about future performances**?

\*\*\*

* Which portfolio is more likely to be **profitable in the long run**?
* Which portfolio is more likely to **lose money in the long run**?

\*\*\*

*[The rest of the survey is identical to Study1, starting from “Do you personally invest in financial markets”]*

**STUDY 3**

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

*[Risk Avoiding Condition]*

Please take a minute to read this scenario and look at the graphs. Please read everything carefully.

Imagine that you inherited money from a family member. **You want to invest that money in two mutual funds. You have narrowed down your selection to three funds, all offered by investment firms with a solid reputation**: Gamma, Epsilon, and Sigma. Although all funds have yielded satisfying returns in the past, there is a key distinction between these funds (as shown in the table below): In the past, Gamma and Epsilon have tended to perform similarly over time, while Gamma and Sigma have tended to perform quite differently over time.

Your task is to choose two funds to invest in (either Gamma & Epsilon, or Gamma & Sigma). **This is important: when choosing between "Gamma & Epsilon" and "Gamma & Sigma", you want to make a low-risk investment. You don't care about trying to make huge returns, you only care about making a safe, low-risk investment.**

*[Here: table presented in Appendix B; Participants are randomly shown Version A or B]*

In which portfolio of two funds would you prefer investing in? Please recall that you don't care about trying to make huge returns, you only care about making a safe, low-risk investment.

* Definitely Gamma & Epsilon
* Rather Gamma & Epsilon
* I'm indifferent
* Rather Gamma & Sigma
* Definitely Gamma & Sigma

\*\*\*

*[Risk Seeking Condition]*

Please take a minute to read this scenario and look at the graphs. Please read everything carefully.

Imagine that you inherited money from a family member. **You want to invest that money in two mutual funds. You have narrowed down your selection to three funds, all offered by investment firms with a solid reputation**: Gamma, Epsilon, and Sigma. Although all funds have yielded satisfying returns in the past, there is a key distinction between these funds (as shown in the table below): In the past, Gamma and Epsilon have tended to perform similarly over time, while Gamma and Sigma have tended to perform quite differently over time.

Your task is to choose two funds to invest in (either Gamma & Epsilon, or Gamma & Sigma). **This is important: when choosing between "Gamma & Epsilon" and "Gamma & Sigma", you want make an investment with high returns. You don't care about whether your investment is risky or unsafe, you only care about making a high-return investment.**

*[Here: table presented in Appendix B; Participants are randomly shown Version A or B]*

In which portfolio of two funds would you prefer investing in? Please recall that you don't care about whether your investment is risky or unsafe, you only care about making a high-return investment.

* Definitely Gamma & Epsilon
* Rather Gamma & Epsilon
* I'm indifferent
* Rather Gamma & Sigma
* Definitely Gamma & Sigma

\*\*\*

*[From now on: all conditions. We showed again the table of past returns. For each question below, participants answer on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Gamma-Sigma”, “Definitely Gamma-Sigma” ]*

* Which portfolio is more likely **to lose money in the long run**?
* Which portfolio feels **riskier**?
* Which portfolio is **more likely to be profitable in the long run**?
* Which portfolio is likely to **fluctuate more over time** (meaning sharply moving up and down)?

\*\*\*

*[The rest of the survey is identical to Study1, starting from “Do you personally invest in financial markets”]*

**STUDY 4**

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

**Please take a minute to read this scenario and look at the tables. Please read everything carefully : your decision in this task will determine your bonus payment!**

**You want to invest money in a portfolio of two mutual funds. All the funds shown here are offered by banks with a solid reputation.**

* **A first bank suggests investing in a portfolio made of funds Gamma and Epsilon.** As you notice on the table of historical returns below, Gamma and Epsilon have tended to perform quite similarly over time.
* **Another bank suggests investing in a portfolio made of funds Omega and Sigma.**As you notice on the table of historical returns below, Omega and Sigma have tended to perform quite differently over time.

 *[Here:Table presented in Appendix B; Participants are randomly shown Control Version A, Control Version B, Portfolio Returns Version A, or Portfolio Returns Version B]*

**In which portfolio of two funds would you prefer investing in?**

In order to motivate you to make a choice that you think is best for you,**your bonus payment will be determined by your portfolio choice. You will start with a bonus of 10 cents. Then, we will randomly determine one year of returns (it could be 2011, or 2012, or 2013, etc.) and add or subtract the overall return of the chosen portfolio of two funds on that year, where 1% = 1 cent.**For instance, if the overall portfolio return on the randomly selected year is 10%, then you will receive a bonus of 20 cents (= the 10 cents you started with PLUS 10 cents corresponding to the 10% positive return of the portfolio). However, for instance, if the overall portfolio return on the randomly selected year is -10%, then you won't receive any bonus (= the 10 cents your started with MINUS 10 cents corresponding to the -10% negative return of the portfolio).

Please choose your portfolio below.

* Portfolio Gamma & Epsilon
* Portfolio Omega & Sigma

\*\*\*

*[We showed again the table of past returns. For each question below, participants answer on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Omega-Sigma”, “Definitely Omega-Sigma” ]*

* Which portfolio feels **riskier**?
* Which portfolio is likely to **fluctuate more over time** (meaning sharply moving up and down)?

\*\*\*

*[The rest of the survey is identical to Study 1, starting from “Do you personally invest in financial markets”]*

**REPLICATION OF STUDY 4 WITHOUT FINANCIAL INCENTIVE (See Appendix H)**

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

Please take a minute to read this scenario and look at the tables. Please read everything carefully.

Imagine that you inherited money from a family member. **You want to invest that money in two mutual funds**, and you have a long-term investment horizon (**y**ou want to keep your two funds for at least 10 years).

**All the funds proposed here are offered by banks with a solid reputation**.

* **A first bank suggests investing in Gamma and Epsilon.** As you notice on the table of historical returns below, Gamma and Epsilon have tended to perform quite similarly over time.
* **Another bank suggests investing in Omega and Sigma.**As you notice on the table of historical returns below, Omega and Sigma have tended to perform quite differently over time.

*[Here:Table presented in Appendix B; Participants are randomly shown Control Version A, Control Version B, Portfolio Returns Version A, or Portfolio Returns Version B]*

In which portfolio of two funds would you prefer investing in? Remember that you want to keep your two funds for at least 10 years.

* Definitely Gamma & Epsilon
* Rather Gamma & Epsilon
* I'm indifferent
* Rather Omega & Sigma
* Definitely Omega & Sigma

\*\*\*

*[We showed again the table of past returns. For each question below, participants answer on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Omega-Sigma”, “Definitely Omega-Sigma” ]*

* Which portfolio feels **riskier**?
* Which portfolio is likely to **fluctuate more over time** (meaning sharply moving up and down)?

\*\*\*

*[The rest of the survey is identical to Study 1, starting from “Do you personally invest in financial markets”]*

**STUDY 5**

*[Consent form]*

\*\*\*

Thank you for participating in this study.

This study is about financial decisions. If you know nothing about finance, don't worry, you can still complete the test and your answers still matter to us!

\*\*\*

*[Abstract condition]*

**Imagine that you want to invest in two of the following three company stocks: *Omega*, *Gamma*, and *Epsilon*.** All companies are profitable, **but the expected returns of the stocks depend on the future economic situations.**

|  |  |  |
| --- | --- | --- |
|  | If Situation A occurs in the future | If Situation B occurs in the future |
| Omega stock | **+30% expected returns** | **-10% expected returns** |
| Gamma stock | **+30% expected returns** | **-10% expected returns** |
| Epsilon stock | **-10% expected returns** | **+30% expected returns** |

As you can see in the table, you can expect two kinds of economic situations: Situation A or Situation B. **Situations A and B are equally likely to occur in the future**.

* If Situation A occurs, then Omega and Gamma are expected to yield +30% positive returns, whereas Epsilon is expected to yield -10% negative return.
* If Situation B occurs, then Omega and Gamma are expected to yield -10% negative returns, whereas Epsilon is expected to yield +30% positive return.

**In which two stocks would you prefer investing in?**

* Strongly prefer Omega & Gamma
* Somewhat prefer Omega & Gamma
* I'm indifferent
* Somewhat prefer Omega & Epsilon
* Strongly prefer Omega & Epsilon

\*\*\*

*[Concrete condition]*

**Imagine that you want to invest in two of the following three videogame company stocks: *Omega Games*, *Gamma Games*, and *Epsilon Games*.** All companies are profitable, but**the expected returns of the stocks depend on the future success of videogame consoles.**

**Omega and Gamma both have an exclusivity deal with the videogame console "GameStation", while Epsilon has an exclusivity deal with the videogame console "GameBox**". Usually, only one videogame console is successful and wins the market.  Hence:

|  |  |  |
| --- | --- | --- |
|  | If GameStation wins the market in the future | If GameBox wins the market in the future |
| Omega stock   | **+30% expected returns** | **-10% expected returns** |
| Gamma stock  | **+30% expected returns** | **-10% expected returns** |
| Epsilon stock | **-10% expected returns** | **+30% expected returns** |

As you can see in the table, you can expect two kinds of situations: GameStation wins the market, or GameBox wins the market. **These situations are equally likely to occur in the future.**

* If GameStation wins the market, then Omega and Gamma (which produce games for GameStation) are expected to yield +30% positive returns, whereas Epsilon  (which does NOT produce games for GameStation)  is expected to yield a -10% negative return.
* If GameBox wins the market, then Omega and Gamma (which do NOT produce games for GameBox ) are expected to yield -10% negative returns, whereas Epsilon  (which produces games for GameBox)  is expected to yield a +30% positive return.

**In which two stocks would you prefer investing in?**

* Strongly prefer Omega & Gamma
* Somewhat prefer Omega & Gamma
* I'm indifferent
* Somewhat prefer Omega & Epsilon
* Strongly prefer Omega & Epsilon

\*\*\*

*[Financial literacy test]*

\*\*\*

*[Demographic questions]*

\*\*\*

This is the last question. There is no right or wrong answer!

Imagine that you hesitate between two financial investments.

* Option A has 50% chance of yielding a +30% return, and 50% chance of yielding a -10% negative return.
* Option B has 100% chance of yielding a +10% return

Which investment do you prefer?

* Strongly prefer Option A
* Somewhat prefer Option A
* I'm indifferent
* Somewhat prefer Option B
* Strongly prefer Option B

APPENDIX D – ADDITIONAL ANALYSES (STUDY 1)

Exploratory questions were included for the second batch of participants in Study 1. These questions were placed after the open-ended question (see Appendix C).

All items below rated on a 5-point scale ranging from “Definitely false” to “Definitely true”

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Financial literacy | Non-diversifying fund | Diversifying fund | p-value\*  |
|   |   | Mean | *S.D.* | Mean | *S.D.* |   |
| ...increase the chance that my overall investment **loses money in the long run** | Top (N=101) | 3.07 | *1.17* | 2.30 | *1.14* | <.001 |
| 2nd (N=101) | 3.11 | *1.07* | 2.75 | *0.94* | 0.05 |
| 3rd (N=131) | 3.04 | *1.03* | 2.91 | *0.96* | 0.36 |
| Bottom (N=114) | 2.86 | *1.05* | 3.09 | *1.02* | 0.13 |
| ...increase the chance that my overall investment **makes money in the long run** | Top (N=101) | 3.31 | *1.00* | 3.08 | *1.04* | 0.14 |
| 2nd (N=101) | 3.59 | *0.81* | 3.24 | *0.90* | 0.01 |
| 3rd (N=131) | 3.42 | *0.88* | 3.20 | *1.02* | 0.11 |
| Bottom (N=114) | 3.50 | *0.92* | 3.26 | *1.02* | 0.12 |
|  ...increase the **fluctuations of my overall investment** (meaning moving up and down widely) | Top (N=101) | 3.71 | *1.29* | 2.28 | *1.16* | <.001 |
| 2nd (N=101) | 3.38 | *1.24* | 2.88 | *1.24* | 0.03 |
| 3rd (N=131) | 3.35 | *1.11* | 3.19 | *1.20* | 0.33 |
| Bottom (N=114) | 3.20 | *0.97* | 3.24 | *1.11* | 0.83 |
|  ...increase the chance that my overall investment yields **stable returns** | Top (N=101) | 2.64 | *1.11* | 3.64 | *1.04* | <.001 |
| 2nd (N=101) | 3.10 | *1.12* | 3.48 | *1.00* | 0.04 |
| 3rd (N=131) | 3.43 | *1.00* | 3.27 | *1.15* | 0.31 |
| Bottom (N=114) | 3.32 | *0.94* | 3.20 | *1.04* | 0.41 |
|  ...make the returns of my overall investment **easier to monitor** | Top (N=101) | 3.49 | *1.17* | 2.97 | *1.08* | 0.003 |
| 2nd (N=101) | 3.77 | *1.01* | 2.64 | *1.11* | <.001 |
| 3rd (N=131) | 3.79 | *0.99* | 2.75 | *1.16* | <.001 |
| Bottom (N=114) | 3.78 | *0.90* | 3.04 | *1.11* | <.001 |
|  ...make the returns of my overall investment **easier to predict** | Top (N=101) | 3.34 | *1.14* | 3.08 | *1.12* | 0.18 |
| 2nd (N=101) | 3.71 | *1.08* | 2.64 | *1.16* | <.001 |
| 3rd (N=131) | 3.91 | *0.92* | 2.79 | *1.17* | <.001 |
| Bottom (N=114) | 3.84 | *0.91* | 3.14 | *1.08* | <.001 |
| \*t-test of difference between correlated and uncorrelated asset |  |  |  |  |

APPENDIX E – ADDITIONAL ANALYSES (STUDY 3)

For each question below, participants answered on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Gamma-Sigma”, “Definitely Gamma-Sigma”.

The scale was coded from -2 (Definitely Gamma-Epsilon, i.e., the non-diversified portfolio) to +2 (Definitely Gamma-Sigma, i.e., the diversified portfolio), with 0 corresponding to “Both Portfolios Equally”.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Item | Financial literacy | Mean | *S.D.* | t-test of difference from zero (**p-value**) | t-test of the effect of the risk-seeking manipulation (**p-value**) |
| Which portfolio feels **riskier?** | Top (N=132) | -0.43 | *1.21* | <.001 | 0.94 |
| 2nd (N=177) | 0.05 | *1.21* | 0.58 | 0.16 |
| 3rd (N=159) | 0.38 | *1.13* | <.001 | 0.14 |
| Bottom (N=128) | 0.26 | *0.94* | 0.003 | 0.33 |
| Which portfolio is likely to **fluctuate more over time (or sharply moving up and down)?** | Top (N=132) | -0.48 | *1.30* | <.001 | 0.69 |
| 2nd (N=177) | 0.17 | *1.19* | 0.05 | 0.78 |
| 3rd (N=159) | 0.28 | *1.23* | 0.005 | 0.52 |
| Bottom (N=128) | 0.12 | *1.09* | 0.2 | 0.67 |
| Which portfolio is more likely to **lose money in the long run?** | Top (N=132) | -0.16 | *0.80* | 0.02 | 0.59 |
| 2nd (N=177) | -0.05 | *0.83* | 0.47 | 0.71 |
| 3rd (N=159) | 0.08 | *0.89* | 0.29 | 0.31 |
| Bottom (N=128) | 0.15 | *0.86* | 0.05 | 0.22 |
|  Which portfolio is more likely to be **profitable** in the long run? | Top (N=132) | 0.17 | *0.86* | 0.02 | 0.76 |
| 2nd (N=177) | 0.05 | *0.93* | 0.47 | 0.12 |
| 3rd (N=159) | 0.00 | *1.04* | 1 | 0.88 |
| Bottom (N=128) | -0.07 | *0.96* | 0.41 | 0.08 |

APPENDIX F – ADDITIONAL ANALYSES (STUDY 4)

For each question below, participants answered on a 5-point scale, labelled “Definitely Gamma-Epsilon”, “Somewhat Gamma-Epsilon”, “Both Portfolios Equally”, “Somewhat Omega-Sigma”, “Definitely Omega-Sigma”.

The scale was coded from -2 (Definitely Gamma-Epsilon, i.e., the non-diversified portfolio) to +2 (Definitely Omega-Sigma, i.e., the diversified portfolio), with 0 corresponding to “Both Portfolios Equally”.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Item | Financial literacy | Control Condition | Portfolio returns condition | t-test of the effect of the portfolio return (vs. control) manipulation (**p-valu**e) |
|   |   | Mean | *S.D.* | t-test of difference from zero (**p-value**) | Mean | *S.D.* | t-test of difference from zero (**p-value**) |
| Which portfolio feels **riskier?**  | Top (N=143) | -0.82 | *1.11* | <.001 | -0.92 | *1.06* | <.001 | 0.57 |
| 2nd (N=131) | -0.48 | *1.17* | 0.002 | -1.05 | *1.05* | <.001 | 0.006 |
| 3rd (N=159) | -0.03 | *1.12* | 0.84 | -0.60 | *1.20* | <.001 | 0.002 |
| Bottom (N=149) | 0.23 | *1.14* | 0.08 | -0.58 | *1.21* | <.001 | <.001 |
| Which portfolio is likely to **fluctuate more over time** (meaning sharply moving up and down)? | Top (N=143) | -1.08 | *1.07* | <.001 | -1.24 | *1.09* | <.001 | 0.39 |
| 2nd (N=131) | -0.68 | *1.37* | <.001 | -0.92 | *1.28* | <.001 | 0.29 |
| 3rd (N=159) | -0.30 | *1.27* | 0.04 | -0.56 | *1.32* | <.001 | 0.2 |
| Bottom (N=149) | 0.18 | *1.11* | 0.16 | -0.48 | *1.44* | 0.008 | 0.002 |

APPENDIX G – REPLICATION OF STUDY 4 WITHOUT FINANCIAL INCENTIVE

**Method**

407 MTurk participants (57.4% female, mean age=32.8) were paid $1 to participate in this study. We assigned participants to either a “portfolio returns” condition or a control condition.

In the control condition, participants first read a scenario in which one bank was proposing two funds with visibly correlated returns shown on a table (Gamma & Epsilon, the “non-diversified portfolio”), while another bank was proposing two other funds with visibly negatively correlated returns (Omega & Sigma, the “diversified portfolio”). Like in the previous studies, there were two versions of each table (see Appendix B).

In the “portfolio returns” condition, the scenario was identical, with the exception that we provided aggregate portfolio returns. It was thus visible and salient that the diversified portfolio had less volatile returns than the non-diversified portfolio.

Then, participants were reminded that they invested for the long term, and chose their investment on a 5-point scale ranging from -2 ( “definitely Gamma & Epsilon”) to +2 ( “definitely Omega & Sigma”) with a middle point 0 (“I’m indifferent”).

As manipulation checks, we measured risk perception and volatility perception like in the previous studies.

We measured financial literacy with the same test as in the previous studies.

**Results and Discussion**.

*Data Exclusion.* 17 participants (4.2% of all participants) failed the attention check and were excluded from analysis.

*Manipulation Checks*. While in the control condition, risk and volatility perceptions were similar to what we found in Study 2, providing portfolio returns made all participants perceive the diversified portfolio as significantly less risky and less volatile, as show in the table below:



*Note. Means indicate response to the questions, where answers are coded from -2 (Definitely Gamma-Epsilon, i.e., the non-diversified portfolio) to +2 (Definitely Omega-Sigma, i.e., the diversified portfolio), with 0 corresponding to “Both Portfolios Equally”.*

*Investment Decision.* We regressed the investment decision on the mean-centered financial literacy score, a binary variable capturing the effect of the manipulation (coded -1 for control and +1 for portfolio returns), and their interaction. We found significant main effects of financial literacy (t(386)=4.66, *p*<.001) and of “portfolio returns” (t(386)=2.37, *p*=.02), and a significant interaction effect ((386)=-2.78, *p*=.006), indicating that the “portfolio returns” manipulation had a stronger effect among participants with low financial literacy, as confirmed below.

We then proceeded to a quartile analysis. In the control condition, as shown on the figure below, top quartile participants invested in the diversified portfolio (M= .83, SD=1.20; significantly different from zero, t(39)=4.36, *p*<.001), while bottom quartile participants invested in the non-diversified portfolio (M=-.39, SD=1.19; t(63)=-2.63, *p*=.01). As hypothesized (H4), providing portfolio returns made bottom quartile participants invest in the diversified portfolio (M=.43, SD=1.02). This was significantly different from zero (t(48)=2.94, *p*=.005), and significantly different from the investment in the control condition (t(111)=3.85, *p*<.001). This shows that lay investors are potentially influenced by portfolio volatility, although they cannot infer it from covariance information (i.e., past returns of individual funds).



APPENDIX H – INVESTMENT DECISIONS IN ALL STUDIES, WITH AND WITHOUT DATA EXCLUSION

In all studies, we excluded data from participants who failed the same attention check embedded in the financial literacy questionnaire. We provide below the analyses of investment decisions across four financial literacy quartiles, after data exclusion (as reported in the manuscript), and without any data exclusion.

In Studies 1 and 4, participants could choose among one diversified and one non-diversified portfolio; we report the proportion of participants investing in the diversified portfolio. In Studies 2, 3, 4bis, and 5, participants reported their investment on a scale ranging from -2 to +2, where -2 indicates a strong preference for the non-diversified portfolio, +2 indicates a strong preference for the diversified portfolio, and 0 is the indifference point.

We also report the p-value of tests comparing investment decisions with chance (or indifference) level. For Studies 1 and 4, chance level is 50%. For Studies 2, 3, 4bis and 5, chance level is 0.

Orange color indicates that participants invested in the non-diversified portfolio, significantly (p<.05) different from chance level. Dim orange indicates marginal significance level (p<.10). Green color indicates that participant invested in the diversified portfolio, significantly (p<.05) different from chance level. Dim green indicates marginal significance level (p<.10).

|  |  |
| --- | --- |
|  | Study 1 |
|  | Data exclusion | No Data exclusion |
|  | N | Proportion investment in diversifying fund | test vs. chance level | N | Proportion investment in diversifying fund | test vs. chance level |
| Lay investors | 230 | 37% | p<.001 | 275 | 36% | p<.001 |
| 3rd quartile | 229 | 49% | p=.79 | 258 | 48% | p=.54 |
| 2nd quartile | 169 | 62% | p=.002 | 169 | 62% | p=.002 |
| Expert investors | 185 | 62% | p=.001 | 198 | 66% | p<.001 |
| *Total* | *813* |  |  | *900* |  |  |

|  |  |
| --- | --- |
|  | Study 2 |
|  | Data exclusion | No Data exclusion |
|  | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level |
| Lay investors | 91 | -0.46 | p<.001 | 95 | -0.47 | p<.001 |
| 3rd quartile | 101 | 0.06 | p=.61 | 104 | 0.07 | p=.56 |
| 2nd quartile | 96 | 0.32 | p=.10 | 98 | 0.33 | p=.01 |
| Expert investors | 95 | 0.95 | p<.001 | 98 | 0.9 | p<.001 |
| *Total* | *383* |  |  | *395* |  |  |
|  | **Study 3 - Risk avoiding condition** | **Study 3 - Risk seeking condition** |
|  | Data exclusion | No Data exclusion | Data exclusion | No Data exclusion |
|  | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level |
| Lay investors | 61 | -0.51 | p=.001 | 65 | -0.45 | p=.005 | 67 | 0.1 | p=0.48 | 68 | 0.09 | p=0.55 |
| 3rd quartile | 76 | 0.11 | p=.51 | 80 | 0.09 | p=.57 | 83 | 0.06 | p=0.7 | 87 | 0.06 | p=0.7 |
| 2nd quartile | 87 | 0.06 | p=.71 | 89 | 0.05 | p=.76 | 90 | 0.06 | p=0.67 | 92 | 0.05 | p=0.67 |
| Expert investors | 66 | 0.82 | p<.001 | 67 | 0.82 | p<.001 | 66 | 0.26 | p=0.1 | 67 | 0.28 | p=0.07 |
| *Total* | *290* |  |  | *301* |  |  | *306* |  |  | *314* |  |  |

|  |  |  |
| --- | --- | --- |
|  | **Study 4 - Control condition** | **Study 4 - Providing Portfolio Performance** |
|  | Data exclusion | No Data exclusion | Data exclusion | No Data exclusion |
|  | N | Proportion investment in diversifying fund | test vs. chance level | N | Proportion investment in diversifying fund | test vs. chance level | N | Proportion investment in diversifying fund | test vs. chance level | N | Proportion investment in diversifying fund | test vs. chance level |
| Lay investors | 80 | 39% | p=.06 | 81 | 39% | p=.07 | 69 | 75% | p<.001 | 74 | 74% | p<.001 |
| 3rd quartile | 77 | 57% | p=.91 | 84 | 55% | p=.84 | 82 | 73% | p<.001 | 89 | 74% | p<.001 |
| 2nd quartile | 65 | 74% | p<.001 | 65 | 74% | p<.001 | 66 | 64% | p=.04 | 67 | 64% | p=.02 |
| Expert investors | 66 | 77% | p<.001 | 66 | 77% | p<.001 | 77 | 69% | p=.001 | 77 | 69% | p=.001 |
| *Total* | *288* |  |  | *296* |  |  | *294* |  |  | *307* |  |  |

|  |  |  |
| --- | --- | --- |
|  | **Study 4Bis (appendix) - Control condition** | **Study 4bis (appendix) - Providing Portfolio Performance** |
|  | Data exclusion | No Data exclusion | Data exclusion | No Data exclusion |
|  | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level |
| Lay investors | 64 | -0.39 | p=.01 | 71 | -0.42 | p=.004 | 49 | 0.43 | p=.005 | 55 | 0.4 | p=.006 |
| 3rd quartile | 41 | 0.15 | p=.50 | 42 | 0.17 | p=.44 | 50 | 0.28 | p=.13 | 53 | 0.32 | p=.07 |
| 2nd quartile | 48 | 0.25 | p=.12 | 48 | 0.25 | p=.12 | 55 | 0.38 | p=.01 | 55 | 0.38 | p=.01 |
| Expert investors | 40 | 0.83 | p<.001 | 40 | 0.83 | p<.001 | 43 | 0.74 | p<.001 | 43 | 0.74 | p<.001 |
| *Total* | *193* |  |  | *201* |  |  | *197* |  |  | *206* |  |  |

|  |  |
| --- | --- |
|  | **Study 5** |
|  | Data exclusion | No Data exclusion |
|  | N | Mean invest--ment | test vs. chance level | N | Mean invest--ment | test vs. chance level |
| Lay investors | 111 | -0.54 | p<.001 | 121 | -0.5 | p<.001 |
| 3rd quartile | 125 | -0.38 | p=.003 | 130 | -0.35 | p=.005 |
| 2nd quartile | 76 | 0 | p=1 | 77 | 0.01 | p=.94 |
| Expert investors | 78 | 0.54 | p=.001 | 80 | 0.49 | p=.003 |
| *Total* | *390* |  |  | *408* |  |  |