Subjective Risk-Return Trade-off[*]

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Abstract

We survey 2,548 representative U.S. respondents to estimate subjective risk-return trade-offs in savings, government bonds, stocks, real estate, gold, and cryptocurrencies. We document a robust negative relationship between perceptions of risk and return among risky assets, which is universal even for financially literate respondents. Strong asset-specific preferences, reflected in a large deviation of return perception from the average, lead to a significant negative risk-return trade-off. Both strong optimism and pessimism contribute to negative risk-return trade-offs with similar magnitudes. Negative risk-return trade-offs translate into under-diversified portfolios, as investors avoid assets that are perceived to generate a low return and high risk.

JEL Classification: *D81, G11, G12, G50, G51*

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1 Introduction

Textbook finance dictates the basic "high risk - high return" principle, which states that expected returns rise with risk in equilibrium.[1] Investors shall weigh the risk-return trade-off in their asset allocation decisions. Do individual investors believe "higher returns are associated with higher risk," and do they trade off risk and returns in their portfolio construction?

To address our research questions, we conducted a survey administered by the Understanding America Study (UAS) at the University of Southern California (USC), based on a nationally representative sample of 2,548 U.S. respondents. We ask questions about subjective perceptions of returns and risks for six asset classes — savings, government bonds, stocks, real estate, gold, and cryptocurrencies. We also ask the respondents to evaluate the following five attributes of assets that may shape their perceptions of assets' risk: (1) price stability during an economic crisis; (2) ability to protect wealth from inflation; (3) liquidity; (4) the extent to which an asset generates cash flow; (5) tangibility. To test whether respondents' portfolio choices align with their beliefs, we ask questions about their asset holdings for each asset class and relate their portfolio choices to their risk-return perceptions.

In contrast with the classical "high risk-high return" principle, we document statistically strong and robust *negative* subjective risk-return trade-offs for four classes of risky assets (stocks, real estate, gold, and cryptocurrencies), while historical data implies a *positive* objective risk-return trade-off. Respondents expect higher returns on an asset they perceive to be less risky than other assets. For example, 554 (77%) of the 716 respondents who believe that real estate yields higher returns than stocks believe that real estate is less risky than stocks. Specifically, we estimate the subjective risk-return trade-offs for 15 asset pairs from all six asset classes. The subjective risk-return trade-offs are consistently and significantly negative for all six pairs of risky assets (real estate, gold, stocks, and cryptocurrency): a unit increase in risk perception is associated with a decrease in return perception with magnitudes ranging from 0.227 (*s.e.* = 0.038) to 0.389 (*s.e.* = 0.038) units. The risk-return relationship generally turns positive when we compare a risky asset with a risk-free asset, except for a pair of a safe asset and gold.

[1]The principle is consistent with asset pricing theories – e.g., Markowitz (1952), Sharpe (1964), Lintner (1965), Mossin (1966), Merton (1973), Rubinstein (1976), Breeden and Litzenberger (1978), Lucas (1978), Breeden (1979), Campbell and Cochrane (1999), Bansal and Yaron (2004), Barro (2009), and so on.

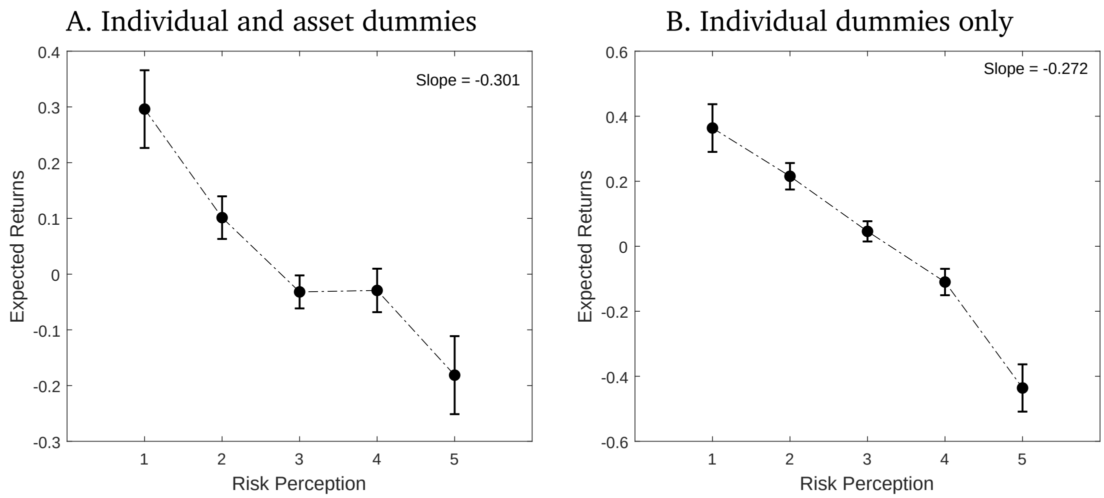

Figure 1. **Risk-Return Trade-offs Among Risky Assets.** These figures show the point estimates and 95% confidence intervals of expected returns for levels of risk perceptions. Panel A is conditional on individual and asset-specific dummies, and Panel B is conditional on individual dummies only. Confidence intervals are computed based on standard errors clustered at the respondent level.

Moreover, we pool all four classes of risky assets and regress their subjective returns on the subjective risks, controlling for asset and individual dummies. We find that a unit increase in risk perception is associated with a decrease of 0.3 units (*s.e.* = 0.022) in return perception. We also find that specific types of risk, such as price instability during a crisis, inflation risk, and liquidity risk, are negatively related to subjective returns. Figure 1 displays the average expected returns for each level of risk perception.[2] The average expected returns notably decrease with risk perception, exhibiting a negative risk-return trade-off, irrespective of whether we control for asset dummies or not.

As an alternative way to estimate subjective risk-return trade-offs at the respondent level, we regress expected returns on risk perception for each respondent. The average risk-return trade-off of respondents reporting at least two risky assets is −0.23 (*s.e.* = 0.018). In addition, 49.9% of the respondents believe in the "low risk–high return" relationship, while only 20.7% of the respondents believe in the "high risk–high return" relationship.[3]

Can respondents' strong asset-specific preferences explain the negative risk-return trade-offs?

[2]The variable of risk perception is scaled from 1 to 5, with 1 being very safe and 5 being very risky. The variable of expected return is scaled from 1 to 5, with 1 being a minimal return and 5 being a very high return.

[3]If we narrow the sample to respondents reporting at least three risky assets, the average risk-return trade-off is −0.26 (*s.e.* = 0.019). 56.6% of the respondents believe in the "low risk, high return" relationship, whereas only 21.9% believe in the "high risk, high return" relationship.

For example, some respondents may see a dim prospect of the stock market and perceive a high risk simultaneously ("high risk – low return"), failing to realize that the general equilibrium effect would imply a low risk that matches a low level of return. Conversely, bullish respondents may expect a particular asset to outperform others and consider it safe, neglecting the associated risk. Our empirical results indicate that strong asset-specific preferences reflected in a large return deviation from average perceptions (mean absolute deviation) lead to negative risk-return trade-offs. That is, the stronger the return perception deviation, the larger the negative risk-return magnitude. Both strong optimism and pessimism contribute to negative risk-return trade-offs with similar magnitudes. Moreover, while asset-specific preferences reflected in return perception deviations are important, risk perception deviations have little explanatory power in explaining risk-return trade-offs.

Then, what could potentially influence asset-specific preferences? We illustrate asset-specific preferences with a concrete example of trust in U.S. firms (e.g., Guiso, Sapienza, and Zingales, 2008; Giannetti and Wang, 2016). We ask two questions about trust in our survey: how much do you trust the integrity of U.S. corporations, and how much do you trust most companies are capable of creating value for their investors? Respondents with low levels of trust report significantly lower expected returns and higher subjective risk for stocks; meanwhile, trust in U.S. firms is uncorrelated with subjective returns and risk for gold. In turn, we show that trust in firms contributes to a negative risk-return trade-off between a stock and gold. This illustrates that trust can be a source of asset-specific preferences among other sources.

Can respondents' heterogeneous characteristics explain negative risk-return trade-offs? For example, negative trade-offs could be driven by financially illiterate respondents, or non-asset holders who are less relevant to financial markets or are unfamiliar with assets that we consider (e.g., Ganzach, 2000). In light of this, we further study the heterogeneity in subjective risk-return trade-offs in terms of respondents' characteristics. Thus, we follow the literature and test whether the subjective risk-return trade-offs of the following subsets of respondents are different from those of the remainder of the sample: (1) asset holders; (2) high-wealth respondents (a total asset value in the top 30%, or total asset value ≥ USD $322,500); (3) high-income earners (income ≥ USD $100,000); (4) those with higher education (master's and/or Ph.D.); (5) those who are highly financially literate (a literacy score in the top 30%); and (6) those who are highly intelligent (an intelligence score in the top 30%). We find that while these respondent subsets' subjective risk-return trade-offs are relatively less negative than those of the remainder of the sample, the magnitudes of the difference are not large enough to change the sign of the subjective risk-return trade-off from negative to positive. This result implies that the negative risk-return trade-offs are universal even for financially literate, wealthy, well-educated, and intelligent respondents.

Next, we investigate whether and how subjective risk-return trade-offs are reflected in respondents' portfolio choices. We find that respondents' positions on risky assets are positively correlated with subjective returns and negatively associated with subjective risk, in terms of both intensive and extensive margins. This confirms that respondents' return and risk perceptions align with their actual investment decisions and that their preferences are well-behaved; i.e., respondents are risk-averse and seeking yields. These findings rule out the possibility that unusual risk preferences drive the negative risk-return trade-offs.

Given that individuals' preferences are well-behaved, what would be the implication of the negative subjective risk-return relationship for asset holdings? Investors with negative risk-return trade-offs would overly allocate wealth to an asset perceived as having high returns and low risk. We document that, indeed, the lower the risk-return trade-offs, the higher the concentration of asset holding — represented by the higher Herfindahl-Hirschman Index of asset shares, and the lower the number of asset classes held in a portfolio. Therefore, we confirm that the negative risk-return relationship contributes to under-diversified portfolios.

One may be concerned that our survey respondents do not understand the concept of risk, and thus, their responses to subjective risk are unreliable. This is rendered unlikely by the following four observations. First, the negative risk-return trade-offs are observed even among highly financially literate and highly educated respondents, who are likely to understand the concept of risk. Second, the overall risk perception strongly correlates sensibly with the five risk attributes. That is, respondents perceive a higher risk for assets they believe to be less stable in terms of price during a crisis, have less protection from inflation, and have a higher liquidity risk than other assets. Third, the average risk perceptions for each asset closely match the objective risk measures based on historical data, irrespective of whether we consider long-term or short-term data. Last, portfolio holdings are negatively associated with overall risk perceptions, which is in line with theories and other studies.

Another concern could be that our results are driven by respondents who perceive risk as the probability of loss (e.g., Holzmeister et al., 2020; Zeisberger, 2023). Since respondents may perceive assets with a higher probability of loss to have lower expected returns, our findings of the negative risk-return trade-offs may be mechanically explained by respondents who perceive risk as the probability of loss. This is an unlikely case for two reasons. First, this explanation is inconsistent with our findings of a positive risk-return trade-off between a safe asset and a risky asset (e.g., savings-stocks): Even though stocks apparently exhibit a higher probability of loss than savings, respondents perceive higher expected returns of stocks than savings. Second, we show that our findings do not depend on the definition of risk: Respondents expect lower returns of an asset they perceive to be more volatile during a crisis, have lower inflation protection (high inflation risk), and are less liquid (high liquidity risk).

Related literature. Our study is related to the large literature on individual perceptions of returns or risk based on survey data.[4] Papers closest to our work are a set of papers that also finds negative subjective risk-return trade-offs cross-sectionally (e.g., Ganzach, 2000; Shefrin, 2001, 2002; Rubaltelli, Ferretti, and Rubichi, 2006). Our work differs in the following ways. First, while existing studies also find negative subjective risk-return trade-offs for multiple stocks, mostly using a sample of students, it is unclear whether the same finding holds for respondents who are more relevant for asset markets.[5] Our study provides novel empirical evidence that even asset holders and wealthy households exhibit negative subjective risk-return trade-offs. Second, our paper considers six asset classes and shows that negative subjective risk-return trade-offs are much stronger among risky assets than a pair of a risk-free asset and a risky asset, while existing studies only examine stocks. Third, different from existing studies, we further study how risk-return perceptions are reflected in portfolio choices. Fourth, we consider specific types of risk – price stability during a crisis, inflation, liquidity, and overall risk perception. Last but not least, our paper proposes a measure to capture

[4]E.g., Ganzach (2000), Shefrin (2001), Rubaltelli, Ferretti, and Rubichi (2006), Ganzach et al. (2008), Ben-David, Graham, and Harvey (2013), Weber, Weber, and Nosić (2013), Amromin and Sharpe (2014), Greenwood and Shleifer (2014), Fairley et al. (2016), Goetzmann, Kim, and Shiller (2016), Hartzmark and Sussman (2019), Ameriks et al. (2020), Bordalo et al. (2020), Choi and Robertson (2020), Holzmeister et al. (2020), Adam, Matveev, and Nagel (2021), Bender et al. (2022), D'Acunto et al. (2021), Dimmock et al. (2021), Giglio et al. (2021), Laudenbach, Weber, and Wohlfart (2021), Liu et al. (2021), Reinholtz, Fernbach, and De Langhe (2021), Beutel and Weber (2022), Chinco, Hartzmark, and Sussman (2022), D'Acunto, Hoang, and Weber (2022), Jensen (2022), Lochstoer and Muir (2022), Charles, Frydman, and Kilic (2023), D'acunto et al. (2023), Fenneman et al. (2023), Hackethal et al. (2023), Nagel and Xu (2023), Walters et al. (2023), Gueciouer (2023) and so on.

[5]Notable exceptions are Shefrin (2001) and Shefrin (2002), who show that negative risk-return trade-offs are observed among portfolio managers.

asset-specific preferences and shows that strong asset-specific references reflected in a large return perception deviation, but not risk perception deviation, drive negative risk-return trade-offs, which is a novel finding in the literature.

Our paper also belongs to the literature on the determinants of risk perception (e.g., Weber and Hsee, 1998; Kaufmann, Weber, and Haisley, 2013; Long, Fernbach, and De Langhe, 2018; Holzmeister et al., 2020; Reinholtz, Fernbach, and De Langhe, 2021; Walters et al., 2023; Zeisberger, 2023). For example, Holzmeister et al. (2020) and Zeisberger (2023) highlight the significance of skewness and loss probability in shaping risk perception. We complement this literature by showing that U.S. households perceive price stability during a crisis as a crucial factor influencing their risk perception compared to inflation risk, liquidity risk, and cash flow.

Our paper is also related to Amromin and Sharpe (2014), Giglio et al. (2021), and Nagel and Xu (2023). Our study complements them as this paper explores *cross-sectional* subjective risk-return trade-offs, whereas these previous studies examine *time-series* subjective risk-return trade-offs. Furthermore, we consider overall risk perception as well as multiple types of risks, which are different from the abovementioned studies.

Moreover, Bender et al. (2022) find that their survey respondents perceive high-momentum (or low-profitability, high-investment-expenditure) stocks to have lower expected returns and higher risk than low-momentum stocks (or high-profitability, low-investment-expenditure), exhibiting a negative subjective expected return-risk relationship. Our study is different from theirs in the following way. Their study compares the aggregate average subjective return to the aggregate average subjective risk, where the aggregate average is computed across respondents. However, we test the relationship between risk and return at the respondent level, not the aggregate level, exploiting large variations across respondents after controlling for respondent and asset-specific factors. Furthermore, rather than considering only equities, we consider multiple asset classes. We also complement their study by demonstrating that trust in firms can be another source of a negative risk-return trade-off along with equity characteristics that they consider.

Our study is also related to a group of studies on households' portfolio under-diversification (e.g., Kelly, 1995; Barber and Odean, 2000; Polkovnichenko, 2005; Campbell, 2006; Goetzmann and Kumar, 2008; Gaudecker, 2015; Campbell, Ramadorai, and Ranish, 2019; Reinholtz, Fernbach, and De Langhe, 2021). Multiple explanations have been proposed for under-diversification such as familiarity bias, ignorance, overconfidence, informational frictions, financial literacy, and ambiguity aversion.[6] Our finding provides a complementary but not necessarily mutually exclusive explanation that under-diversification is associated with negative subjective risk-return trade-offs. Last, our study contributes to the extensive literature on the determinants of equity market participation by directly showing the importance of subjective risk and return perceptions on multiple-asset market participation.[7]

2 Survey Description

Our study aims to understand the relationship between individuals' subjective perceptions of risk and return in a cross-sectional setting. As existing surveys do not ask questions on individuals' subjective perception of risks for multiple asset classes, we design our own online survey of U.S. individuals to study their subjective perceptions of risk and returns.

Our survey is administered by the Understanding America Study (UAS) and maintained by the Center for Economic and Social Research at the University of Southern California (USC). The UAS allows researchers to launch a survey of a nationally representative internet panel of approximately 8,000 adult respondents in the U.S., and combine the respondents' answers to previous surveys.[8]

2.1 Survey design

Our survey includes questions on expected returns, risk perceptions, asset holdings, and risk tolerance. In our survey, we elicit beliefs on the following six asset classes: (1) savings, (2) government bonds, (3) stocks, (4) real estate, (5) gold, and (6) cryptocurrencies. Throughout the survey, we provided definitions of all financial terminologies whenever deemed necessary. We allowed respondents to choose "I don't know" in case they were not able to answer the questions in order to filter out answers with little confidence. In what follows, we summarize our survey. The complete

[6] E.g., Odean (1999), Barber and Odean (2001), Benartzi (2001), Grinblatt and Keloharju (2001), Huberman (2001), Goetzmann and Kumar (2008), Gaudecker (2015), and Dimmock et al. (2016), among others.

[7] E.g., Hong, Kubik, and Stein (2004), Guiso and Jappelli (2005), Guiso, Sapienza, and Zingales (2008), Grinblatt, Keloharju, and Linnainmaa (2011), van Rooij, Lusardi, and Alessie (2012), Georgarakos and Inderst (2014), Balloch, Nicolae, and Philip (2015), Dimmock et al. (2016), Kirchler et al. (2017), Kirchler, Lindner, and Weitzel (2018), Bazley et al. (2019), Sias, Starks, and Turtle (2020), Razen, Kirchler, and Weitzel (2020), Lindner et al. (2021), Jo (2022), Strucks and Zeisberger (2023), among others.

[8] The UAS is widely used by researchers who conduct their customized surveys (e.g., Mas and Pallais, 2017; Samek, Kapteyn, and Gray, 2019; Stango and Zinman, 2019; Laudenbach, Weber, and Wohlfart, 2021; Merkoulova and Veld, 2022a,b). The first UAS survey (UAS 1) was conducted in May 2014. As of April 15, 2022, 461 surveys have either been completed or are in the field.

questionnaire and screenshots of the online survey are provided in Appendix I.

Asset holdings. For each asset class, we asked the respondents to describe their asset holdings as follows: 1 = I do not have this asset, 2 = $5,000 or less, 3 = $5,001 to $10,000, 4 = $10,001 to $30,000, 5 = $30,001 to $50,000, 6 = $50,001 to $200,000, 7 = $200,001 to $400,000, 8 = $400,001 or more.

We emphasize to the respondents that their description of their *investment assets* should not include investments in 401(k) or other retirement accounts.

Expected returns. We asked respondents about the returns they would expect for each asset for the next 10 years. We use a 1–5 scale (Likert scale), with 1 being "minimal return" and 5 being "very high returns," because Merkoulova and Veld (2022b), which conducted the UAS 184 survey, show that respondents cannot provide a value of expected returns. Moreover, all assets were displayed on the same screen, and thus, the respondents could observe their answers to each asset class, which effectively allowed them to rank assets in terms of risk and return.

Risk perception. To elicit subjective risk perceptions, we asked respondents to rate the investment risk for each asset on a scale of 1 to 5, with 1 being very safe, 2 = safe, 3 = average, 4 = risky, 5 = very risky, and 6 = "I don't know" (Likert scale), similar to some previous studies (e.g., Nosić and Weber, 2010; Weber, Weber, and Nosić, 2013; Choi and Robertson, 2020; Zeisberger, 2023). There are multiple advantages to posing questions this way. First, with a scale measure, respondents can answer based on their beliefs without knowing the exact value in their minds. Second, unlike studies that focus on crash risk or volatility (e.g., Goetzmann, Kim, and Shiller, 2016; Giglio et al., 2021; Nagel and Xu, 2023), we do not have to define risk. Accordingly, the answers to this question reflect overall perceptions of the risk of assets, which is not necessarily a forecast of variance or skewness of returns. We also asked the respondents about beliefs regarding multiple asset attributes to relate overall risk perceptions to each type of risk. Specifically, we asked respondents how much they agreed with the following statements for each asset in general: (1) When an economic crisis happens, the price of the investment asset remains stable (Hedging concerns); (2) The investment asset protects wealth from inflation (Inflation risk); (3) The investment asset can be easily converted into cash (Liquidity risk); (4) The investment asset pays cash periodically (Cash flow); (5) The investment asset is physically touchable (Tangibility).

Individual characteristics. We also asked about risk tolerance. Furthermore, we link our survey with previous UAS surveys about financial literacy (UAS 121) and intelligence (UAS 83, 84, and 85). Financial literacy in UAS 121 was measured based on van Rooij, Lusardi, and Alessie (2011). Intelligence in UAS 83, 84, and 85 was measured by the Woodcock-Johnson Tests of Cognitive Abilities, which are designed to capture quantitative reasoning and lexical knowledge.

2.2 Survey period and samples

Our survey (UAS 444) was conducted from February 17, 2022, to March 16, 2022.[9] The survey was made available to 3,098 UAS participants who completed UAS 184.[10] Of those 3,098 participants, 2,548 started the survey, 2,509 fully completed the survey, and 550 did not start the survey. Therefore, the final number of respondents is 2,548, with 39 respondents providing incomplete answers. The median respondent takes about 7.6 minutes to answer all survey questions. The 10 – 90 percentile range for the total time to respond is 3.8 – 21.2 minutes. Thus, the respondents took sufficient time to answer the questions carefully. All of the respondents were paid USD $4 to complete the survey.

Table 1 reports the summary statistics of respondents. Our sample is nationally representative, and the basic demographic information confirms this.[11] Panel A shows that the respondents are, on average, 56.61 years old, 44% are men, 62% are married, and 22%, 60%, 13%, and 4% have a high school, a bachelor's degree, master's degree, or a Ph.D., respectively, as their highest level of education. Panel B shows that 84.1% of the respondents are white. Panel C shows that almost 50% of the respondents are currently working, while 26% are retired. Panel D shows that there is a large cross-sectional variation in income level among the respondents; 46.2% have an income level lower than $50,000, while 27.3% have an income level greater than or equal to $100,000. Panel E reports the asset holdings of the respondents: 76.38% have savings, 37.47% invest in stocks, 57.81% invest in real estate, 9.41% invest in gold, 6.9% invest in cryptocurrencies, and 11.87% invest in

[9]Three things alleviate the concern that our results are driven by the specific timing of the survey: (1) Average historical asset returns before the survey period cannot predict the aggregate level of return perceptions regardless of a horizon for average returns; (2) In our panel regressions, we control for asset dummies which capture asset-specific variations that include past performances; (3) we obtain consistent findings in another survey that was conducted in Hong Kong for the period from June 28, 2022, to July 13, 2022.

[10]We used these samples because the UAS 184 respondents participated in UAS 83, 84, 85, and 121, which we link with our study.

[11]Appendix Figure IA1 displays a heatmap that represents the states of residence of the respondents. Our respondents are from all 50 states and the District of Columbia. The proportions of respondents from each state align with the population of each state.

government bonds. Panel A of Figure 2 visualizes these asset holdings.

[Insert Table 1 here]

2.3 Survey Responses

Subjective expected returns and risk. Panel B of Figure 2 shows the relative frequency of the respondents' answers to the question on expected returns for each asset class. On a scale of 1 to 5, with 1 being a minimal return and 5 being a very high return, the average expected returns and standard deviation of expected returns (excluding the "I don't know" answers) are (1) 1.29 and 0.70 for savings, (2) 1.84 and 0.94 for government bonds, (3) 3.35 and 1.18 for real estate, (4) 2.76 and 1.32 for gold, (5) 2.97 and 1.07 for stocks, and (6) 2.31 and 1.25 for cryptocurrencies. Therefore, on average, the respondents expect the highest returns for real estate, followed by those for stocks, gold, cryptocurrencies, government bonds, and savings.

Panel C of Figure 2 shows the relative frequency of respondents' answers to the question regarding their perception of overall risk for each asset class. On a scale of 1 to 5, with 1 being very safe and 5 being very risky, the average risk score and standard deviation of the score, excluding the "I don't know" answers are (1) 1.50 and 0.75 for savings, (2) 2.20 and 1.06 for government bonds, (3) 2.49 and 0.91 for real estate, (4) 2.40 and 0.99 for gold, (5) 3.60 and 0.85 for stocks, and (6) 4.24 and 0.92 for cryptocurrencies. This shows that the respondents believe that cryptocurrencies are the riskiest asset, followed by stocks, real estate, gold, government bonds, and savings.

[Insert Figure 2 here]

Asset attributes. Figure 3 shows the relative frequency of respondents' answers to the questions on multiple types of asset attributes that may shape risk perception. Panel A displays the importance of each type of asset attribute for safe investment. The respondents believe that an asset's price stability during a crisis is the most important risk attribute for a safe investment (average score of 4.34), followed by inflation protection (4.07), liquidity (3.98), cash flow (3.41), and tangibility (2.76). Panel B shows that savings are believed to be the most stable asset in terms of price (3.94), followed by government bonds (3.56), gold (3.28), real estate (2.97), cryptocurrencies (2.19), and stocks (2.11). Panel C shows that real estate is believed to be the best asset that provides protection from inflation (3.41), followed by gold (3.40), government bonds (3.04), stocks (2.92), savings

(2.76), and cryptocurrencies (2.42). Panel D shows that savings are believed to be the easiest asset to be converted to cash (4.65), followed by gold (3.97), stocks (3.63), government bonds (3.46), real estate (3.11), and cryptocurrencies (3.00). Panel E shows that stocks are believed to provide cash flow the most (3.54), followed by savings (3.49), government bonds (2.99), real estate (2.45), gold (2.41), and cryptocurrencies (2.40). Finally, Panel F shows that gold is believed to be the most tangible asset (4.13), followed by real estate (4.11), savings (3.63), government bonds (3.10), stocks (2.37), and cryptocurrencies (1.87). Overall, the respondents' average subjective beliefs about asset attributes are reasonable and consistent with the objective metrics, which supports the validity of their responses in the questionnaire. Their answers to questions on risk tolerance are reported in Appendix Figure IA2.

[Insert Figure 3 here]

Please note that this result is only based on the average perceptions of the respondents for each asset. However, the 1–5 scale used by each respondent may not be comparable to that of other respondents; i.e., A score of 5 (very high return) may translate into different values of expected returns for different respondents. Therefore, we always control for individual-specific dummies when we run regressions to examine subjective risk-return trade-offs.

3 Subjective Risk-Return Trade-off

3.1 Pairwise estimations

We first use pairwise regressions based on a pair of two asset classes to estimate subjective risk-return trade-offs. Pairwise regressions exclude individual-specific reporting bias and thus explore only the variation in the relative subjective risk and return within individuals.[12] Specifically, we run the following regression for each pair of an asset class j and k as follows:

$$Ret_i^{j,k} = \beta^{j,k} Risk_i^{j,k} + \gamma + \epsilon_i^{j,k}, \tag{1}$$

[12] Controlling for individual-specific reporting bias is important because numerical scores of expected returns and risk perceptions may not be comparable across individuals. E.g., for a given metric, Amy's rating of "2" for subjective risk might not reflect the same level of risk as Jane's rating of "2" for subjective risk.

where $Ret_i^{j,k}$ and $Risk_i^{j,k}$ represent the subjective return and risk order of asset j relative to asset k, for individual i, respectively, defined as:

$$Ret_i^{j,k} = Ret_i^j - Ret_i^k,$$
$$Risk_i^{j,k} = Risk_i^j - Risk_i^k,$$

where Ret_i^j and $Risk_i^j$ are answers to the questions on expected returns and risk for asset j.

The bottom 3×3 matrix in Table 2 presents the risk-return trade-off estimates for the four risky assets. All six coefficients are consistently negative: real estate/gold delivers the strongest negative relationship with −0.389 (*s.e.* = 0.038), and gold/cryptocurrency shows the weakest negative relationship with −0.227 (*s.e.* = 0.038), although this relationship is still significant with p-value < 0.001. Furthermore, the values of R-squared are reasonably high for all the risky asset pairs, ranging from 4.3% in real estate/stock to 9.6% in real estate/gold. This indicates that respondents' beliefs exhibit consistent negative risk-return relationships among risky assets that are not driven by a specific asset class.

The first two rows of Table 2 show the risk-return trade-off estimates for a pair of a risk-free asset (savings or government bonds) and a risky asset. The relative expected returns are mostly (7 out of the 9 coefficients) positively associated with relative risk perceptions. That is, respondents expect higher returns on a risky asset perceived as riskier when a risky asset is compared to a risk-free asset (savings or government bonds). In terms of magnitude, the risk-return relationship between stocks and government bonds exhibits the highest positive trade-off: 0.310 (*s.e.* = 0.028) with an R-squared of 9.5%. However, the pairs of savings/real estate, savings/cryptocurrency, and government bonds/real estate do not exhibit a statistically significant and positive risk-return trade-off. Notably, in this case, negative risk-return trade-offs are also observed for gold/savings and gold/government bonds, but magnitudes are smaller than those for the risky asset pairs.

Overall, negative subjective risk-return trade-offs are much stronger among risky assets than a pair of a risk-free asset and a risky asset. Given these findings, we focus on the risky assets in the remaining analyses. Appendix Figures IA3, IA4, IA5, and IA6 plot the average relative returns with average relative risks for a pair of two assets, with/without risk-free assets, and for all respondents or asset holders only.

[Insert Table 2 here]

One concern is that variations in return and risk perceptions ranging from 1 to 5 are not comparable; a subjective return increase from 1 to 2 is not comparable to the increase from 4 to 5 in eq.(1). To address this concern, we replicate the same pairwise analysis with relative risk/return rankings devised using the following sign-function transformation in eq.(2):

$$Sign(Ret_i^{j,k}) = \beta^{j,k} Sign(Risk_i^{j,k}) + \gamma + \epsilon_i^{j,k}, \tag{2}$$

where $Sign()$ is a sign function that takes a value of either +1, 0, or −1 depending on the sign, $Ret_i^{j,k} = Ret_i^j - Ret_i^k$, and $Risk_i^{j,k} = Risk_i^j - Risk_i^k$. Therefore, $Sign(Ret_i^{j,k})$ equals +1 (−1) when a respondent perceives asset class j to have a higher (lower) expected return than asset class k. Likewise, $Sign(Risk_i^{j,k})$ equals +1 (−1) when a respondent perceives an asset class j to be riskier (less risky) than an asset class k. 0 indicates the same level of risk or return between assets j and k. Appendix Table IA1 shows robust negative risk-return trade-offs for risky assets after the sign-function transformation. The risk-return trade-off coefficients range from −0.19 (*s.e.* = 0.037) for real estate/stocks to −0.312 (*s.e.* = 0.056) for real estate/cryptocurrencies. In Appendix Table IA2, we repeat the analysis by restricting the sample to individuals holding assets j and k. Asset holders' subjective beliefs consistently exhibit negative risk-return trade-offs among risky assets, although the pairs of crypto/gold and crypto/stocks are statistically insignificant.

3.2 Individual risk-return trade-off

As an alternative way to examine the average relationship between subjective risk and return, we measure each respondent's subjective risk-return trade-off. This approach allows us to compare the relationship between risk and returns across respondents, thereby controlling for respondent-specific factors in perceptions of risk and return. To this end, we run a regression of return perception on risk perception of risky assets for each respondent. In doing so, we construct two measures by requiring the minimum number of risky assets with non-missing 1-5 scale answers to be either two or three, after excluding "I don't know."

Figure 4 plots and Appendix Table IA3 reports the distributions of respondents' risk-return trade-off coefficients. We find that the average of respondents' risk-return trade-off coefficients exhibit negative risk-return trade-offs, as demonstrated by pairwise and pooled regressions with an estimate of −0.23 (*s.e.* = 0.018) and −0.26 (*s.e.* = 0.019) where the minimum response on assets is two or three, respectively. These average values are statistically significant at the level of 1%, and their magnitudes are similar to those in the pairwise regressions.

[Insert Figure 4 here]

3.3 Pooled regressions

3.3.1 Specifications. We re-examine subjective risk-return trade-offs in a pooled regression setting by exploiting variations across respondents and across multiple asset classes. There are two major advantages to this approach: (1) we can estimate a single coefficient that characterizes the average subjective risk-return trade-offs of all assets and respondents; (2) we can control for the respondent- and asset-specific factors that enable variations in risk and return across assets and respondents to be more comparable. Therefore, we run the following regression:

$$Ret_i^k = \beta Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \tag{3}$$

where Ret_i^k and $Risk_i^k$ represent respondent i's expected returns and risk perception of asset k, which range from 1 to 5; γ_i represents individual dummies to fully control for unobserved individual heterogeneity; and ϕ_k represents asset-specific dummies.[13] β is the coefficient of interest, which captures the risk-return trade-off. Standard errors are clustered at the respondent level throughout our pooled regression analyses.

We further add perceptions of risk attributes (price stability, inflation-hedging, liquidity, cash flow, and tangibility) into eq.(3), as follows:

$$\begin{aligned} Ret_i^k = \beta Risk_i^k &+ \beta_1 Price\ stability_i^k + \beta_2 Inflation_i^k + \beta_3 Liquidity_i^k \\ &+ \beta_4 Cash\ flow_i^k + \beta_5 Tangibility_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \end{aligned} \tag{4}$$

where $Price\ stability_i^k$, $Inflation_i^k$, $Liquidity_i^k$, $Cash\ flow_i^k$, and $Tangibility_i^k$ denote respondent i's perception of the asset attributes of asset k. A higher value indicates a higher risk, that is, lower price stability, weaker inflation protection, less liquidity, lower cash flow, and less tangibility.

[13] We use asset dummies to control for any asset-specific features, such as past performances, transaction costs, liquidity, and volatility.

3.3.2 Results. Columns (1), (3), and (5) report the results with asset and individual dummies, while Columns (2), (4), and (6) report the results with individual dummies only. Column (1) of Table 3 shows that subjective returns are *negatively* associated with overall risk perception in the pooled regression settings. A unit increase in overall risk perception is statistically significantly associated with a 30.1% point decrease in return perception (*s.e.* = 0.022). The negative risk-return trade-offs estimated from our pooled regression are an average of pairwise trade-offs for the risky assets in Table 2, ranging from 22.7% points for gold/cryptocurrency to 38.9% points for gold/real estate).

Column (3) shows that risk perceptions of price stability, inflation, and liquidity are also negatively related to expected returns. This implies that the respondents expect lower returns of an asset they perceive to be more volatile during an economic crisis (high risk in terms of hedging), have lower inflation protection (high inflation risk), or be less liquid (high liquidity risk). Therefore, not only are respondents' overall risk perceptions negatively associated with expected returns, but the negative relationship is also true for specific types of subjective risks. These results are inconsistent with the existing theoretical and empirical studies based on hedging concerns, inflation risk, or liquidity risk and also show that the negative risk-return relationship does not depend on a type of risk.[14]

Column (5) shows that overall risk perception is significantly and negatively associated with subjective expected returns after controlling for the five asset attributes. This result implies that the negative relationships between returns and specific types of risks do not subsume the negative relationship between returns and overall risk perception. Columns (2), (4), and (6) show that controlling for asset dummies in Columns (1), (3), and (5) does not change the economic and statistical significance of the negative relationships between expected returns and respondents' overall perceptions of risk.

Overall, we examine subjective risk-return trade-offs using three approaches and find consistent evidence that our respondents believe in the "high risk–low return" relationship. Appendix Figures IA7, IA8, and IA9 plot the objective risk-return relationships using data from either 1987–2021 or 2020–2021, based on multiple risk measures. These figures show that the objective risk-return relationships are notably positive for any risk metrics and both periods. Therefore, our findings

[14]See Lucas (1978), Lettau and Ludvigson (2001), Acharya and Pedersen (2005), Fang, Liu, and Roussanov (2022), among others.

cannot be rationalized by the data and challenge the conventional wisdom and the principle of "high risk–high return"; that is, our respondents expect *lower* returns on a *higher* risk asset, instead of *higher* returns to compensate for the *higher* risk.[15]

[Insert Table 3 here]

3.4 Out-of-sample validation

We replicate our U.S. survey results based on another dataset collected jointly with a brokerage firm in Hong Kong and administered by CloudResearch. All of the respondents are from Hong Kong with diverse backgrounds; 68% of both parents of the respondents are from Hong Kong, 19% of both parents of the respondents are from mainland China, 9.0% of both parents of the respondents are from mainland/Hong Kong, and the remaining 4% of both parents of the respondents have a non-Hong Kong/non-mainland background. We find that Hong Kong respondents also exhibit a negative subjective risk-return trade-off, despite the different questionnaire from the UAS questionnaire and the respondents having different backgrounds from the UAS survey.

Similar to our UAS survey, this survey elicits subjective risk and return for five risky assets: (1) stocks, (2) derivatives, (3) real estate, (4) gold and other precious metals, and (5) cryptocurrencies and non-fungible tokens (NFTs). In the Hong Kong questionnaire, the respondents first answer whether they believe each risky asset to be a good or bad investment (Question 4.7). Then, if the respondent considers an asset class suitable (not suitable) for investment, Questions 4.8 and 4.9 ask the reason. The respondents can choose an answer from "high (low) expected returns," "stable (unstable) returns," "low (high) investment risk," "high (low) liquidity," "easy (hard) to invest," and "good (bad) hedging against inflation." Given that the Hong Kong questionnaire differs from the UAS questionnaire, we map survey responses to the numeric risk/return perceptions in a way

[15] It might be straightforward to ask respondents whether they believe in the "high risk - high return" principle in finance; however, we chose not to ask it. The main reason is that direct revelation of research intention might bias individuals' responses to risk and return questions. Thus, we prefer to ask about respondents' risk and return perceptions separately and relate them together in our analysis.

consistent with the UAS survey.[16]

We first replicate Figure 1 with the Hong Kong survey in Appendix Figure IA10 with a slightly different calculation. We normalize $Risk_i^k$ and Ret_i^k with respondent-level and asset-specific averages in Panel A (respondent-level average only in Panel B) and scatter-plot the subjective risk-return relationship into 10 bins. The highest-risk decile yields the lowest subjective returns, and the lowest-risk decile yields the highest subjective returns.

Then, we further replicate the pooled regression estimates from Columns (1) and (2) of Table 3 in Appendix Table IA4. The risk-return trade-off is negative at the 1% level of significance: −0.160 (*s.e.* = 0.044) with both individual and asset dummies, and −0.186 (*s.e.* = 0.040) with only individual dummies.

Last, we plot the individual-level risk-return trade-off in Appendix Figure IA12. The average risk-return trade-off is −0.12 (*s.e.* = 0.047) for 208 respondents who report at least four risky assets, and −0.10 (*s.e.* = 0.055) for 116 respondents who report all five risky assets. Overall, we demonstrate that our finding of the negative risk-return trade-offs from the U.S. survey is robustly observed in the Hong Kong survey, both in the pooled regressions and individual-level estimations.

4 Mechanisms

Based on the U.S. respondents and the supplementary Hong Kong survey data, we have established strong and robust negative subjective risk-return trade-offs. This section aims to provide potential underlying mechanisms for these subjective negative risk-return trade-offs. First, we consider the possibility that asset-specific preferences contribute to the risk-return relationship. Thus, we characterize asset-specific preferences and show whether and how they contribute to the negative risk-return trade-offs. Then, we test whether the negative risk-return trade-offs are driven by a particular group of respondents, such as those with poor financial literacy or non-asset holder sur-

[16]We code expected returns and risk perceptions as follows.

$$Ret_i^k = \begin{cases} 1 & \text{if asset } k \text{ is a good investment choice due to high expected returns} \\ 0 & \text{if asset } k \text{ is a good or bad investment choice, due to reasons not related to returns} \\ -1 & \text{if asset } k \text{ is a bad investment choice due to low expected returns} \end{cases}$$

$$Risk_i^k = \begin{cases} 1 & \text{if asset } k \text{ as a bad investment choice due to unstable returns } \textit{and} \text{ a high investment risk} \\ 0.5 & \text{if asset } k \text{ as a bad investment choice due to either unstable returns } \textit{or} \text{ a high investment risk} \\ 0 & \text{if asset } k \text{ as a good or bad investment choice due to reasons not related to two reasons} \\ -0.5 & \text{if asset } k \text{ as a good investment choice due to either stable returns } \textit{or} \text{ a low investment risk} \\ -1 & \text{if asset } k \text{ as a good investment choice due to both stable returns } \textit{and} \text{ a low investment risk} \end{cases}$$

vey respondents. Subsequently, we examine the validity of respondents' risk perceptions and provide evidence that our results are not due to invalid or erroneous responses in risk perceptions. Finally, we rule out the possibility that respondents have non-standard preferences for risk and returns by examining their actual investment decisions with return/risk perceptions.

4.1 Asset-specific Preferences

4.1.1 Asset-specific preferences and subjective risk-return trade-offs. A natural explanation for our findings is that respondents do not think the return is a risk compensation as implied by the equilibrium asset pricing model. Respondents might hold asset-specific preferences that drive the subjective risk and return perceptions in the opposite direction. In particular, some respondents may have bullish (high return expectations) views about assets and perceive them to be safe, failing to adequately form the level of risk perception corresponding to high return expectations. Conversely, bearish respondents may have a low return expectation with a high-risk perception at the same time. To test this possibility, we first propose a measure to capture asset-specific preferences using strongly high or low return/risk perceptions about a specific asset relative to perceptions about other assets and other respondents' perceptions. Then, we examine how the asset-specific preferences are linked to the subjective risk-return trade-offs. Specifically, we first compute the absolute mean deviation of a return perception across risky assets for each individual i as follows:

$$Avg.|Ret\_Resid|_i \stackrel{\text{def}}{=} \frac{1}{K_i}\sum_{k=1}^{K_i} |Ret\_Resid_i^k|, \tag{5}$$

where K_i represents the number of risky assets each respondent answered about returns, and $Ret\_Resid_i^k$ denotes the residuals from the regression of returns on asset and individual dummies. Given asset and individual dummies, this measure captures how much each individual's overall return perception deviates from the average individual and average asset return perceptions. To distinguish between positive (optimism) and negative (pessimism) deviations, we also construct the absolute mean deviation measure conditional on $Ret\_Resid_i^k > 0$ or $Ret\_Resid_i^k < 0$. We repeat these steps by replacing return perception with risk perception to study asset-specific preferences reflected in risk perceptions. Using the aforementioned measures, we classify all individuals into quintiles based on the level of each measure. Then, we re-run the main regression in eq. (3) for each quintile to examine whether and how the risk-return trade-off varies with asset-specific preferences.

Figure 5 displays the point estimates of the risk-return trade-off (β in eq. (3)) for each quintile. The left (right) panels present the results for the return (risk) perception deviations. Panel A shows a monotonic decrease in the risk-return trade-off coefficient with the return deviation. The risk-return coefficient is –0.647 (*s.e.* = 0.060) for the 5th quintile group, compared to a very small magnitude of –0.057 (*s.e.* = 0.013) for the 1st quintile group. This suggests that strong asset-specific preferences reflected in a large return deviation from the average perception contribute to negative risk-return trade-offs.

We further investigate whether, between positive preference (optimism) and negative preference (pessimism), one is more important than the other in driving negative risk-return trade-offs. Panel C displays the risk-return trade-off coefficients for each quintile, sorted based on individuals' *positive* return deviation from average asset and individual perceptions (optimism), i.e., $Avg.|Ret\_Resid|$, conditional on $Ret\_Resid > 0$. The figure exhibits the same pattern as in Panel A, with *Beta* = –0.495 for Q5 and –0.053 for Q1. This suggests that strong optimism reflected in return deviations leads to a significant negative risk-return trade-off. Panel E displays the results from sorting individuals based on *negative* return deviation (pessimism), i.e., $Avg.|Ret\_Resid|$, conditional on $Ret\_Resid < 0$. The results suggest that the stronger the negative return deviation, the larger the negative risk-return magnitude (*Beta* = –0.530 for Q5 and –0.059 for Q1). The magnitude in Q5 (–0.530) is similar to the one in Panel C (–0.495). Therefore, it appears that both positive and negative return deviations contribute to negative risk-return trade-offs with similar magnitudes.

We repeat the same exercise for risk deviations, which represent the extent to which each individual exhibits a large risk deviation relative to the average risk perception. Panel B shows that the differences in risk deviations do not exhibit a clear pattern. Although the magnitudes from the 4th and 5th quintiles are larger than those from the 2nd and 3rd quintiles, they are not statistically significantly different from the magnitude in the 1st quintile. Panel D displays the results for positive risk deviation, i.e., $Avg.|Risk\_Resid|$, conditional on $Risk\_Resid > 0$. Individuals with strongly high-risk perceptions exhibit a larger negative risk-return trade-off. However, the differences in magnitudes are not statistically distinguishable from each other. Panel F displays the results for negative risk deviation, i.e., $Avg.|Risk\_Resid|$, conditional on $Risk\_Resid < 0$, and shows no clear pattern across the five quintile groups. Appendix Table IA5 shows that wealthy (financially literate) respondents exhibit a larger (smaller) return deviation from the average return perceptions.

The asset-specific preferences that we aim to capture using a large deviation of return or risk perception could be closely related to the behavioral affect heuristic that is proposed to explain negative risk-return trade-offs (e.g., Finucane et al., 2000; Ganzach, 2000; Shefrin, 2001). However, our study differs from the previous studies that rely on the behavioral affect heuristic for the explanation in the following ways: (1) We propose a way to measure asset-specific preferences using strongly high or low return/risk perceptions about a specific asset relative to perceptions about other assets and other respondents' perceptions. (2) We find that strong asset-specific preferences reflected in return deviations are important in explaining the degree of a negative risk-return trade-off, while risk deviations are not important. This suggests that asset-specific preferences or the affect heuristic is expressed mainly through return perceptions, but not risk perceptions. (3) We also find that a positive return deviation is as important as a negative return deviation, meaning that both excessive optimism and pessimism contribute equally to the negative risk-return trade-offs. Therefore, we contribute to the literature by proposing a characterization of asset-specific preferences and also providing novel empirical findings.

[Insert Figure 5 here]

4.1.2 Asset-specific Preferences: Example of Trust in U.S. Firms. In the previous subsection, we demonstrated that asset-specific preferences significantly drive negative risk-return trade-offs. Then, what could be a potential source of asset-specific preferences?[17] This subsection offers an illustrative example that sheds light on a potential source of asset-specific preferences. A high degree of trust in U.S. firms could generate a positive sentiment toward these firms, leading to higher expected returns and lower risk perceptions for their stocks. However, it is not apparent why trust in U.S. firms would influence perceptions of other assets, such as gold. Therefore, we examine whether trust in firms can contribute to stock-specific preferences that drive negative risk-return trade-offs between stocks and gold, for example. Specifically, in our survey, we elicit trust in U.S. firms with the following two questions: how much do you trust the integrity of U.S. corporations (termed as

[17]Numerous factors can be a source of asset-specific preferences; for example, Hartzmark, Hirshman, and Imas (2021) provide experimental evidence that ownership causes more optimistic beliefs after receiving a positive signal and more pessimistic beliefs after receiving a negative signal. Moreover, Bender et al. (2022) show that their survey respondents perceive high-momentum (or low-profitability, high-investment-expenditure) stocks to have lower expected returns and higher risk than low-momentum stocks (or high-profitability, low-investment-expenditure), illustrating that these stock characteristics could be a source of asset-specific preferences.

integrity, henceforth), and how much do you trust most companies are capable of creating value for their investors (termed as ability, henceforth) on a 1 - 5 scale (1 refers to "Not trusting at all", and 5 refers to "Completely trusting"). We utilize answers to these questions and relate them to return and risk perceptions for stocks and gold.

Columns (1) and (2) of Table 4 present the relationship between trust in firms' integrity and perceptions of return/risk for stocks (Panel A), gold (Panel B), and stocks relative to gold (Panel C). First, we find that integrity is significantly associated with the return and risk perceptions for stocks, but not for gold. This suggests that trust could play a role in shaping stock-specific preferences. Second, as predicted, integrity exhibits a positive (negative) association with expected returns (risk perception) for stocks, thereby contributing to a negative risk-return trade-off. Interestingly, the magnitude of the relationship between integrity and expected returns is 0.266 (*s.e.*=0.030), which contrasts with a much smaller magnitude of –0.094 (*s.e.*=0.025) for risk perception. This result aligns well with our previous finding that asset-specific preferences primarily manifest in return perceptions rather than risk perceptions. Last, in Panel C, we show that integrity contributes to the negative risk-return trade-off between stocks and gold by driving up (down) the expected returns (risk perception) for stocks relative to gold with a magnitude of 0.302 (–0.077).

Alternatively, Columns (3) and (4) of Table 4 examine the trust in firms' ability instead of integrity and show consistent results: perceptions of U.S. firms' ability are positively (negatively) associated with expected returns (risk perception) for stocks. However, there is no significant relationship between perceptions of U.S. firms' ability and return/risk perception for gold. Appendix Figure IA11 visually reiterates the aforementioned points – (1) trust only matters for stocks, but not for gold; (2) trust increases (decreases) expected returns (risk) for stocks; and (3) there is a larger variation in expected returns associated with trust than risk perception. Overall, our finding illustrates that trust in U.S. firms can be one of the sources of stock-specific preferences that lead to a negative risk-return trade-off between stocks and other assets.

[Insert Table 4 here]

4.2 Respondents' Characteristics

This subsection tests whether a subgroup of respondents mainly drives the negative risk-return trade-offs. For example, some non-asset holders in our sample might form biased beliefs and drive the negative risk-return trade-offs. Alternatively, low financial literacy or intelligence could also be a reason for our finding, as some individuals might not be able to gauge risk-return relationships properly. To rigorously test these potential explanations, we interact overall risk perception with a set of dummy variables representing different subsets of respondents and analyze the heterogeneity in subjective risk-return trade-offs.

For a set of dummy variables, we use the following variables, motivated by the literature: (1) Asset holder, a dummy variable that takes a value of one for a positive holding of each asset (Basak and Cuoco, 1998; Malloy, Moskowitz, and Vissing-Jørgensen, 2009; Elkamhi and Jo, 2023) (asset and respondent-specific; 33% of respondents). (2) High wealth, a dummy variable that takes a value of one for respondents whose total asset value is within the top 30%. (Malloy, Moskowitz, and Vissing-Jørgensen, 2009; Lettau, Ludvigson, and Ma, 2019; Bender et al., 2022; Elkamhi, Jo, and Nozawa, 2024) (respondent-specific; 30% of respondents). (3) High income, a dummy variable that takes a value of one for an income level greater than or equal to $100,000 (respondent-specific; 27% of respondents). (4) High education, a dummy variable that takes a value of one for respondents with a master's degree or Ph.D. (respondent-specific; 18% of respondents). (5) High intelligence, a dummy variable that takes a value of one for intelligence scores from UAS 83, 84, and 85 in the top 30% (Grinblatt, Keloharju, and Linnainmaa, 2011) (respondent-specific). (6) High financial literacy: a dummy variable that takes a value of one for financial literacy scores from UAS 121 in the top 30% (van Rooij, Lusardi, and Alessie, 2011, 2012; Lusardi and Mitchell, 2014; Reinholtz, Fernbach, and De Langhe, 2021) (respondent-specific). We determine the cutoffs for these subgroups, such that a similar proportion of the total respondents is present in the total sample. However, as some variables are categorical, the proportions are not identical. Therefore, we repeat the exercise with different cutoffs. Then, we run the following regression:

$$Ret_i^k = \beta_1 Risk_i^k + \beta_2 Risk_i^k \times Z_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \tag{6}$$

where Z_i^k is one of the aforementioned dummy variables.

Columns from (2) to (7) of Table 5 show that the perceptions of all of the respondent subsets exhibit more positive risk-return trade-offs than the rest of the sample. The differences captured by the OLS estimates of the interaction terms are statistically significant at the level of 1%, except those for *High wealth*.[18] In terms of magnitude, the *High financial literacy* respondents exhibit the largest difference in the risk-return trade-off relative to others with an estimate of 0.165 (*s.e.* = 0.033), followed by the *High-income* respondents. However, the differences in the risk-return trade-offs between the considered subsets and the rest of the sample are not sufficiently large to reverse the sign of risk-return trade-offs from negative to positive. For example, the *High financial literacy* respondents' beliefs still exhibit a negative risk-return relationship with an estimate of −0.191 (= 0.165 − 0.356). Column (8) shows that when all of the interaction variables are added, *High wealth*, *High education*, and *High intelligence* are not significant. Figure 6 visualizes risk-return trade-offs for each subset of respondents. For each subgroup, we plot the point estimates of expected returns and 95% confidence intervals of expected returns for each level of risk perception, conditional on respondent- and asset-specific factors. As Table 5 shows, the slopes of the risk-return trade-offs remain negative, even though the slopes are less negative than for the entire sample, as displayed in Figure 1.

[Insert Table 5 here]

[Insert Figure 6 here]

To ensure that our results do not depend on the cutoffs, we vary the cutoffs for the subgroup definition. Panel A of Table IA6 shows that the difference in the risk-return trade-off between *Asset holder* and *Non-asset holder* respondents increases as we raise the cutoff for the definition of the asset holder group. For example, when the *Asset holder* group is simply defined as respondents with a positive asset holding value, the risk-return trade-off coefficient for the asset holder group is higher by 0.130 than the non-asset holder group that compares to 0.176 when the *Asset holder* group is defined as respondents with an asset holding value greater than $400,000. This implies that asset holding is an important respondent characteristic linked to risk-return trade-offs. However, the perceptions of the top asset holders continue to exhibit a negative risk-return trade-off with a coefficient of −0.123 (= 0.176 − 0.299). This indicates that asset holdings cannot fully explain the negative risk-return trade-offs. The same pattern is observed for income, education, and financial literacy. The group with the least negative subjective risk-return trade-off is respondents with a

[18] That is, high-wealth respondents hold similar negative risk-return relationship beliefs as the other respondents

Ph.D., with a risk-return slope of −0.033 (= 0.286 − 0.319). However, it appears that the level of total wealth is not an important determinant of subjective risk-return trade-offs.

Overall, our heterogeneity analysis shows that some subsets of respondents emphasized in the literature exhibit subjective risk-return relationships that are relatively less negative than the rest of the respondents. However, considered subsets of respondents' beliefs still exhibit negative subjective risk-return trade-offs for risky assets; thus, respondents' characteristics cannot fully explain our findings. The negative risk-return perception prevails even among asset holders, well-educated, and wealthy respondents. Moreover, this result is highly robust to different cutoffs for subgroup definitions.

4.3 Risk Perception Validation

One potential concern could be that the respondents do not understand the concept of risk, and the negative risk-return trade-offs are driven by reporting errors or biased beliefs about risk. In this subsection, we provide empirical evidence that rules out this possibility.

4.3.1 Subjective risk VS Objective risk To begin with, we test whether the average risk perceptions well align with the objective risk measures. Suppose our respondents indeed do not understand the concept of risk. In that case, the overall risk perceptions of our respondents, on average, would not match the objective financial risk measures, as their answers are mostly determined by a random individual-specific understanding of risk. To test this possibility, we examine the following historical data of six asset classes from January 1987 to December 2021: (1) savings (assuming that both the first and second moments are zero); (2) the CRSP value-weighted returns for stocks; (2) the 30-day Treasury bill rate for government bonds; (3) the percentage change in the S&P/Case-Shiller U.S. National Home Price Index for real estate; (4) the returns of gold price in USD per ounce from the Commodity Research Bureau; and (5) the Bitcoin returns from October 2014 to December 2021 for cryptocurrencies. All returns are converted into real values by subtracting the consumer price index growth rate.

Figure 7 plots the averages of respondents' risk perception on a scale of 1 to 5 (y-axis) versus the objective risk measures based on the data (x-axis) using: standard deviation (Panel A), beta with respect to stock returns (CRSP value-weighted returns) (Panel B), and minus beta with respect to

NBER recessions (Panel C). We also compare the subjective risk perceptions with the objective risk measures computed from a recent two-year period (2020–2021) to account for the possibility that respondents' risk perceptions are mostly shaped by recent market movements. The figure shows that even though we include all of the respondents who are non-asset holders, or financially illiterate, the overall risk perceptions well match the objective measures of risk. On average, the respondents perceive cryptocurrencies to be the riskiest, followed by stocks, gold/real estate, government bonds, and savings, which aligns with the historical data. Furthermore, the result is robust to different measures of objective risk and unaffected by the sample time period used to estimate the objective risk measures. This evidence strongly suggests that the respondents' understanding of risk is not likely to be responsible for our finding of the negative risk-return trade-offs.

[Insert Figure 7 here]

4.3.2 Overall risk perceptions and asset attributes We further exploit our questions on asset attributes that may shape overall risk perception to test the validity of the responses to questions on risk perceptions. We run the following regression of risk perceptions on asset attributes.

$$
\begin{aligned}
Risk_i^k &= \beta_1 Price\ stability_i^k + \beta_2 Inflation_i^k + \beta_3 Liquidity_i^k + \beta_4 Cash\ flow_i^k \\
&\quad + \beta_5 Tangibility_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k,
\end{aligned}
$$

where $Risk_i^k$ represents the subjective overall risk perception of asset k for respondent i; $Price\ stability_i^k$, $Inflation_i^k$, $Liquidity_i^k$, $Cash\ flow_i^k$, and $Tangibility_i^k$ denote respondent i's perception of the asset attributes of asset k; γ_i represents individual dummies; and ϕ_k represents asset dummies. As before, higher values of variables indicate lower price stability, lower inflation protection, lower liquidity, lower cash flow, and lower tangibility. For ease of comparison, we standardize these variables and overall risk perception to unit standard deviation.

Table 6 reports the results. In Panel A, we control for both individual and asset dummies; in Panel B, we only control for individual dummies. In Columns (1) to (5), the overall risk perception is regressed on only one variable at a time. In Column (6), all five asset attributes are added to perform a horse-race regression. The results can be summarized as follows.

First, all asset risk attributes are positively related to the overall subjective risk in a sensible way. That is, respondents perceive a higher risk for assets they believe to be less price stability, less liquidity, provide less protection from inflation, and generate less cash flow. Therefore, all of the asset attributes considered reasonably align with the overall risk perception, irrespective of whether we control for asset dummies or not. This further supports the validity of the survey responses on risk perceptions.

Second, in terms of magnitude, price stability is the most important consideration. Column (6) shows that a one-standard-deviation increase in the perception of the riskiness of an asset with respect to price stability is associated with a 0.294-standard-deviation increase in the overall risk perception. This is consistent with Panel A of Figure 3, which shows that among the attributes that we consider, respondents believe the price stability of an asset is the most important for a safe investment.

[Insert Table 6 here]

In summary, we provide evidence that strongly supports the validity of respondents' answers to the questions related to risks. The average risk perceptions align well with the historical data, and the overall risk perceptions are reasonably associated with the asset attributes. Along with these pieces of evidence, Figure 3 shows that respondents' beliefs about asset attributes are consistent with the historical data. For example, savings are believed to be the most stable assets in terms of price and the easiest to convert into cash. Gold is believed to be the most tangible asset, followed by real estate. Equally importantly, we will show below that overall risk perception is negatively associated with portfolio holdings, which is consistent with theories and past studies. These sets of evidence strongly support the validity of our respondents' perceptions of risk.

4.4 Risk-Return preferences test

Lastly, we examine whether and how the return and risk perceptions of the respondents are related to their investment behaviors, which is important in studying the mechanism of our findings for the following reasons. First, the respondents' answers to return and risk questions may be random and not reflect their true beliefs, which may drive our finding of the negative risk-return trade-offs. Thus, by examining their portfolio choices, we can further test the validity of their responses. Second, retail investors' demand for lottery-like stocks, which tend to have high betas and high volatility, is an important explanation for empirically observed low stock returns and high risk relationships (e.g., Bali, Cakici, and Whitelaw, 2011; Bali et al., 2017). Similarly, negative subjective risk-return trade-offs could be explained by investors' appetite for riskier assets, i.e., respondents may require higher returns for less risky assets to get compensation for holding such an undesirable asset. We test whether this is the case by examining respondents' investment behaviors regarding risky assets.

We run the following pooled regressions to test the relationship between asset participation and investors' return and risk perceptions.

$$y_i^k = \beta_1 Ret_i^k + \beta_2 Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \qquad y_i^k = \beta Ret_i^k / Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \tag{7}$$

where y_i^k is an outcome variable that captures a holding of a risky asset k. We use the following three variables for y_i^k: (1) the share of each risky asset in the total value of risky assets (total effect); (2) an indicator that takes a value of one for a positive holding of an asset (extensive margin); and (3) the share of each risky asset in the total value of risky assets, conditional on a positive share (intensive margin). As we asked for the dollar range values of asset holdings, we picked the mid-points of each range to compute the risky asset share.

Columns (1) to (4) of Table 7 show that for both the total effect and extensive margin of asset participation, respondents' asset participation decisions are positively associated with subjective returns and negatively associated with subjective risk perception. Moreover, this finding is robust regardless of whether we rely on return and risk separately or together (as a ratio). Thus, our respondents are more likely to hold an asset perceived as having higher returns and lower risk.[19] Furthermore, such an asset accounts for a larger portion of risky asset portfolios, as indicated in Columns (1) and (2) for the total effect. Economic magnitudes are significant. For example, a one-standard-deviation increase in the expected returns is associated with an 8.74% point (= 0.070 × 1.248) increase in the extensive margin of asset participation (*s.e.* = 0.008), which translates into a sizable 21.3% increase, evaluated at the mean. Furthermore, a one-standard-deviation increase in risk perception is associated with a 3.52% point (= 0.030 × 1.267) decrease in the extensive margin of asset participation (*s.e.* = 0.010), which translates into an 8.6% decrease, evaluated at the mean. When we restrict our attention to asset holders in Columns (5) and (6), the expected returns are significant but not risk

[19]While the positive relationship between asset participation and subjective asset returns could be due to investors' optimistic bias (e.g., Brunnermeier and Parker, 2005), our findings of the subjective negative risk-return trade-offs cannot be driven by investors' optimistic bias, as asset holders exhibit more positive risk-return trade-offs than non-asset holders as shown in Table 5.

perceptions, indicating that asset holders seek higher yields and are less concerned about risk.

The implications of these findings can be summarized as follows. First, our findings suggest respondents prefer an asset with high returns and low risk. Therefore, we rule out the possibility that respondents' preferences for riskier assets drive the negative risk-return trade-offs.[20] Second, these findings are also consistent with the findings of previous studies that rely on survey evidence to examine the relationship between risk perceptions and portfolio choices (e.g., Nosić and Weber, 2010; Amromin and Sharpe, 2014; Ameriks et al., 2020; Choi and Robertson, 2020; Holzmeister et al., 2020; Giglio et al., 2021) in a sense that risk perception is negatively related to financial risk-taking. Therefore, our findings mitigate potential concerns that the survey responses do not reflect respondents' true beliefs and that the respondents do not understand the concept of risk. In fact, our evidence strongly suggests that their investment behaviors match their responses, demonstrate internal consistency in the survey responses, and alleviate the concern that the respondents do not understand the concept of risk.

[Insert Table 7 here]

5 Implications for portfolio under-diversification

Overall, our findings show that beliefs about risk and return are well reflected in portfolio choices. The respondents tend to hold assets they perceive to earn higher returns and be less risky than other assets in terms of both overall risk perception and specific types of risk. Given this preference for return and dislike of risk, what would be an implication of the negative subjective risk-return relationship for asset holdings?

If a respondent forms a belief system that exhibits a strong negative risk-return relationship, there exists a particular asset that is perceived to deliver the highest return and the lowest risk. Given the preference for return and dislike of risk that we find, this respondent would only invest in this asset with the highest subjective Sharpe ratio and avoid other assets that are not desirable.

[20] Appendix Table IA7 shows that all of the above results are robust without asset dummies, and overall risk perception is significantly associated with the intensive margin of asset participation decisions as well. Appendix Table IA8 shows that our results are not driven by any particular asset, as the tests based on pairs of assets produce consistent results. Appendix Table IA9 shows that the respondents' asset market participation decisions are negatively associated with each type of risk – respondents are less likely to hold an asset they perceive to be less stable in terms of price, intangible, and provide less protection from inflation, and generate less cash flow than other assets. Finally, Appendix Table IA10 shows that not being able to answer the questions about expected returns, overall risk perception, or asset attributes is significantly and negatively related to asset market participation decisions, consistent with Merkoulova and Veld (2022b).

Conversely, if a respondent's belief system exhibits a positive risk-return relationship, the respondent would weigh the risk-return trade-off when constructing her portfolio. Therefore, we hypothesize that the stronger a negative risk-return trade-off is, the less diverse the portfolio would be.

We examine whether negative risk-return trade-offs indeed lead to under-diversified portfolios by regressing the degree of asset under-diversification on the degree of risk-return trade-off cross-sectionally. In order to measure the degree of asset under-diversification, we rely on two measures: (1) The number of risky asset securities held in a portfolio. (2) The Herfindahl-Hirschman Index (HHI) of risky asset shares, defined as the sum of squares of each risky asset share (i.e., $s^2_{i,\text{stocks}} + s^2_{i,\text{gold}} + s^2_{i,\text{real estate}} + s^2_{i,\text{crypto}}$, where $s_{i,k}$ denotes the share of risky asset k in the total value of risky assets for respondent i). At one extreme, the value of this index is one if a respondent holds only one risky asset class. In contrast, when a respondent has an equal-weighted portfolio, then the value of this index is 0.25 ($=0.25^2 \times 4$). For the measure of each respondent's risk-return trade-off, we use the measure we computed in Section 3.2 by regressing expected returns on risk perception among risky assets for each respondent.

Columns (1) to (4) of Table 8 show that the number of risky asset securities held in a portfolio is positively associated with the degree of risk-return trade-off, implying that the stronger negative the risk-return trade-off is, the less diversified a portfolio is. This suggests that investors avoid exposure to assets that they are bearish about (extensive margin). In terms of magnitude, a one-standard-deviation increase in the risk-return trade-off measure is associated with a 3.40% point ($= 0.046 \times 0.739$) increase in the number of risky asset securities (*s.e.* = 0.021), which translates into a 3.08% increase, evaluated at the mean. Moreover, Columns (5) to (8) show that the degree of risk-return trade-off is significantly and negatively associated with the HHI value (intensive margin). This indicates that the stronger negative the risk-return trade-off is, the higher the HHI value (less diversified, or more concentrated portfolio).[21] In summary, these findings confirm that the negative risk-return relationship indeed leads to under-diversified portfolios. Overall, we contribute to the literature by demonstrating a negative risk-return trade-off as an alternative explanation for households' under-diversified portfolios.

[21] In terms of magnitude, a one-standard-deviation increase in the risk-return trade-off measure is associated with a 1.77% point ($= 0.024 \times 0.739$) decrease in the HHI value (*s.e.* = 0.007), which translates into a 2.09% decrease, evaluated at the mean.

[Insert Table 8 here]

6 Conclusion

This paper provides evidence of negative cross-sectional subjective risk-return trade-offs among risky assets, which challenges a basic principle of textbook finance. Our findings show that the negative relationship holds even for large asset holders and wealthy respondents who are more relevant for asset markets than others — these observable characteristics are insufficient to explain the negative risk-return trade-offs. Instead, we identify that strong asset-specific preferences, reflected in a large deviation of return perception from the average, drive the negative risk-return trade-offs. Interestingly, risk deviation from the average has little effect on the negative risk-return trade-offs. Furthermore, our study indicates that both optimism and pessimism in return perceptions play an equally important role in explaining the negative risk-return trade-offs.

We also document evidence of subjective beliefs and portfolio choices: Investors are more likely to hold (and hold more on intensive margin) an asset that is expected to earn a higher return and is perceived as being less risky. Moreover, investors with a higher degree of "low risk, high return" belief tend to hold fewer asset classes and have a more concentrated portfolio.

Our paper leaves some important unanswered questions. Specifically, future research can explore the psychological foundation to explain why retail investors do not understand the textbook risk-return trade-offs implied by equilibrium models. Also, we need to understand the sources of asset-specific preferences beyond trust in firms, which we uncover for stocks. Moreover, we do not know why investors' subjective risk-return trade-offs depend on asset preferences reflected in return perceptions, but not risk perceptions.[22] These important questions require further investigation and are beyond the scope of our current research.

[22]One possible explanation is that the second moment of asset returns is more predictable than the first moment of asset returns. Thus, risk carries less information on investor preferences.

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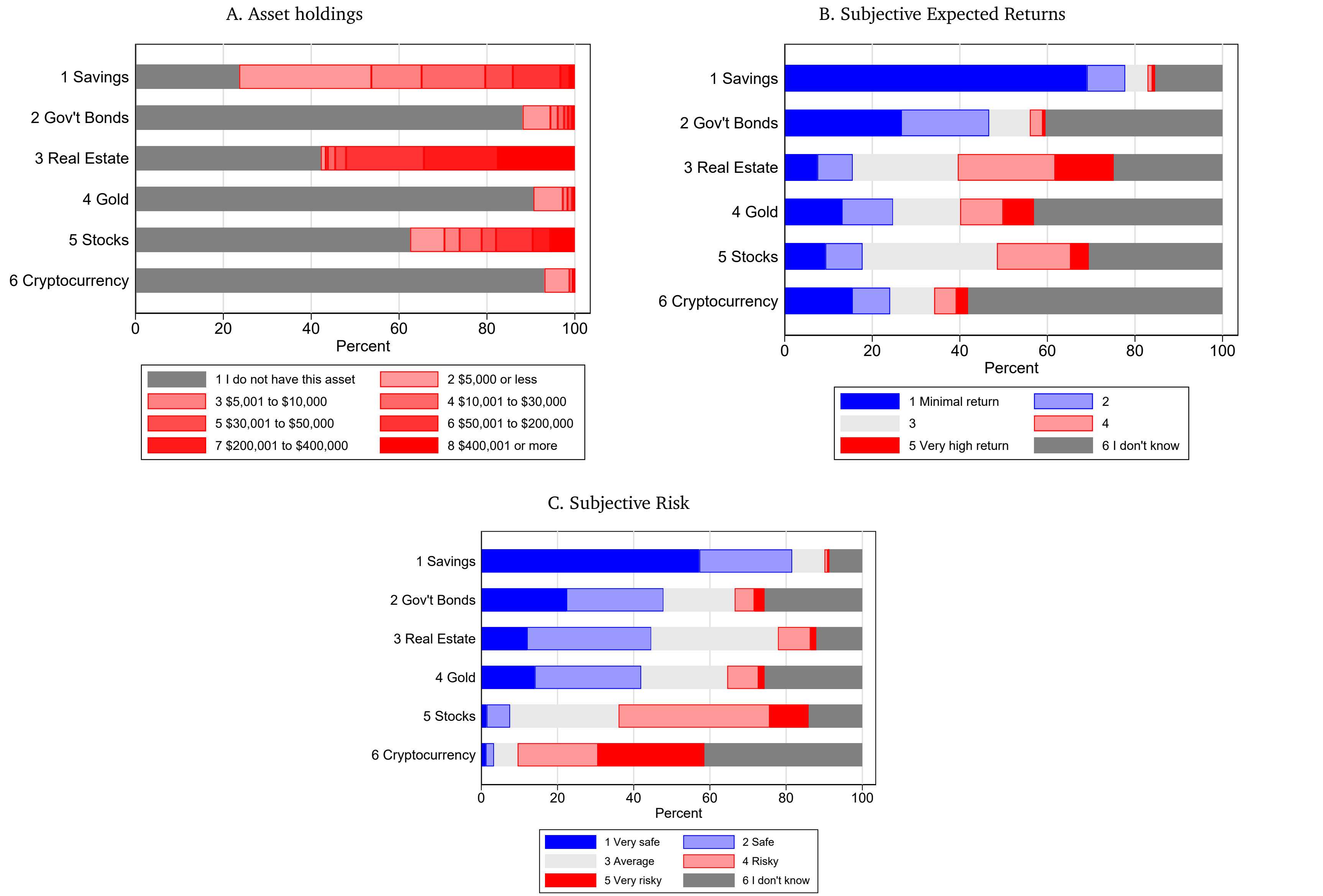

Figure 2. **Beliefs About Expected Returns and Risk.** Panel A shows the frequency of respondents' answers to the following question about asset holdings in the percentage term for each asset class: For each type of financial asset that you have, what is the approximate total value? Please do not include the value of any assets held in retirement accounts such as IRAs or 401(k)s. Panel B shows the frequency of respondents' answers to the following question about expected returns for each asset class: The expected return for an asset is the profit or loss anticipated by an investor as a percentage of the initial investment. Please provide your best estimate of the level of expected returns for each asset over the next 10 years, on a scale of 1 to 5, with 1 being a minimal return and 5 being a very high return. Panel C shows the frequency of respondents' answers to the following question about the expected risk for each asset class: How would you rate the investment safety (risk) for each asset?

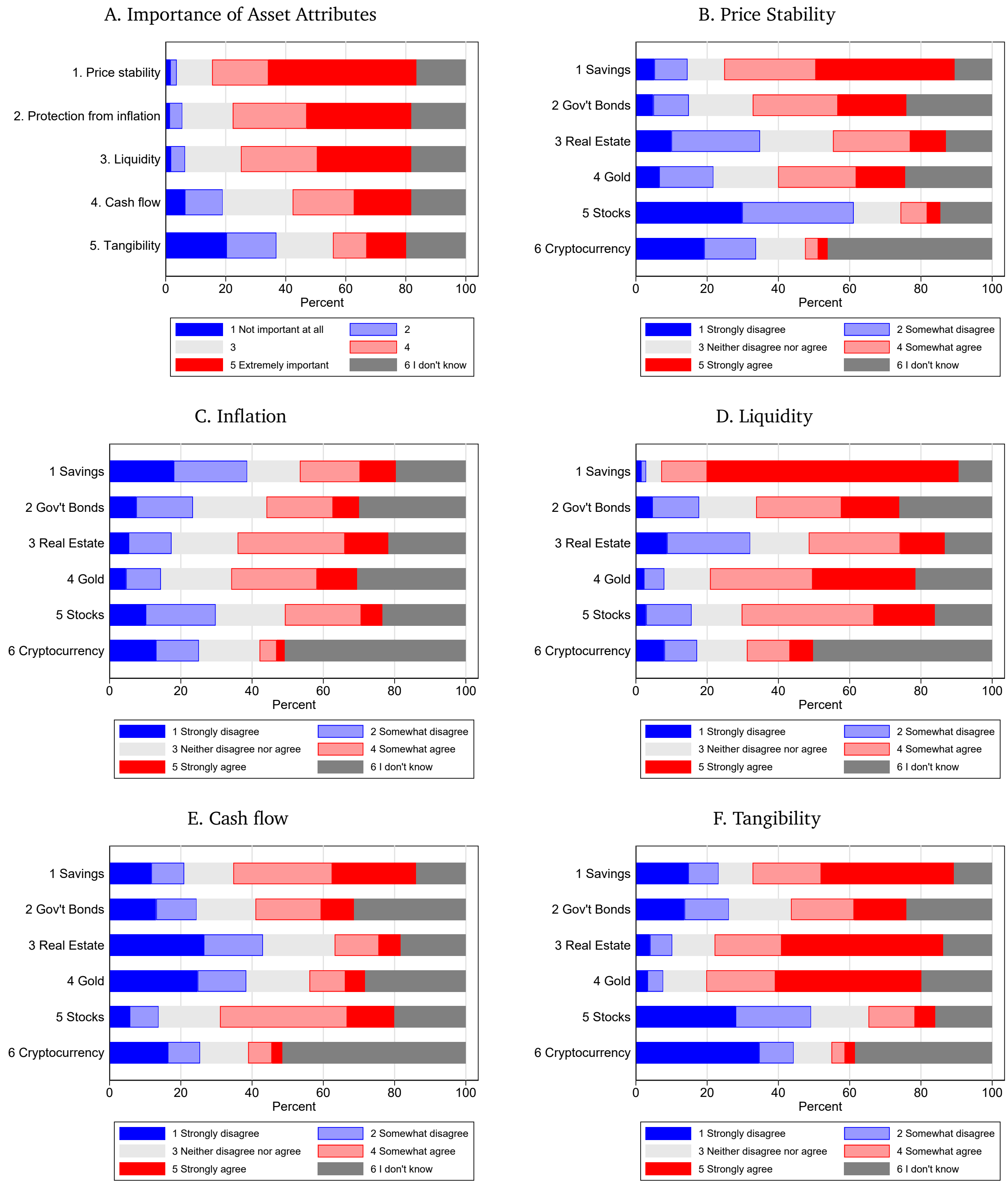

Figure 3. **Beliefs About Asset Attributes.** These figures show the frequency of respondents' answers to the following questions: Panel A. To maximize investment safety, how important are the following attributes? Price stability, Protection from inflation, Liquidity, Cash flow, and Tangibility; How much do you agree with the following sentences for each asset in general? Panel B. When an economic crisis happens, the price of the investment asset remains stable; Panel C. The investment asset protects wealth from inflation; Panel D. The investment asset can be easily converted into cash; Panel E. The investment asset pays cash periodically; Panel F. The investment asset is physically touchable.

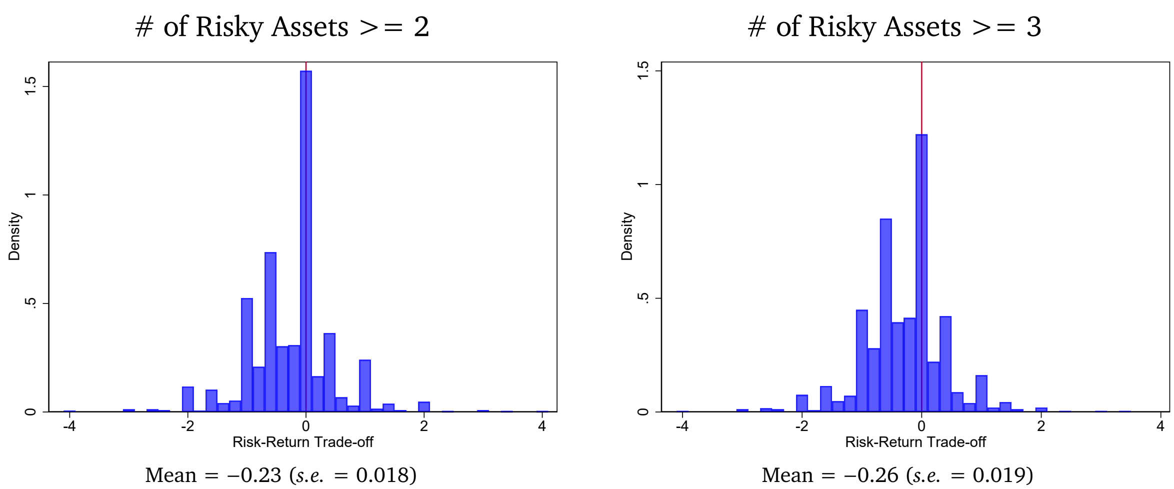

Figure 4. **Distribution of Individual Risk-return Trade-off.** These figures plot the distributions of individual degree of risk-return trade-off. The individual degree of risk-return trade-off is estimated by running a regression of expected returns on risk perception among risky assets for each respondent. In the left (right) panel, the minimum number of risky assets to estimate the risk-return trade-off is two (three).

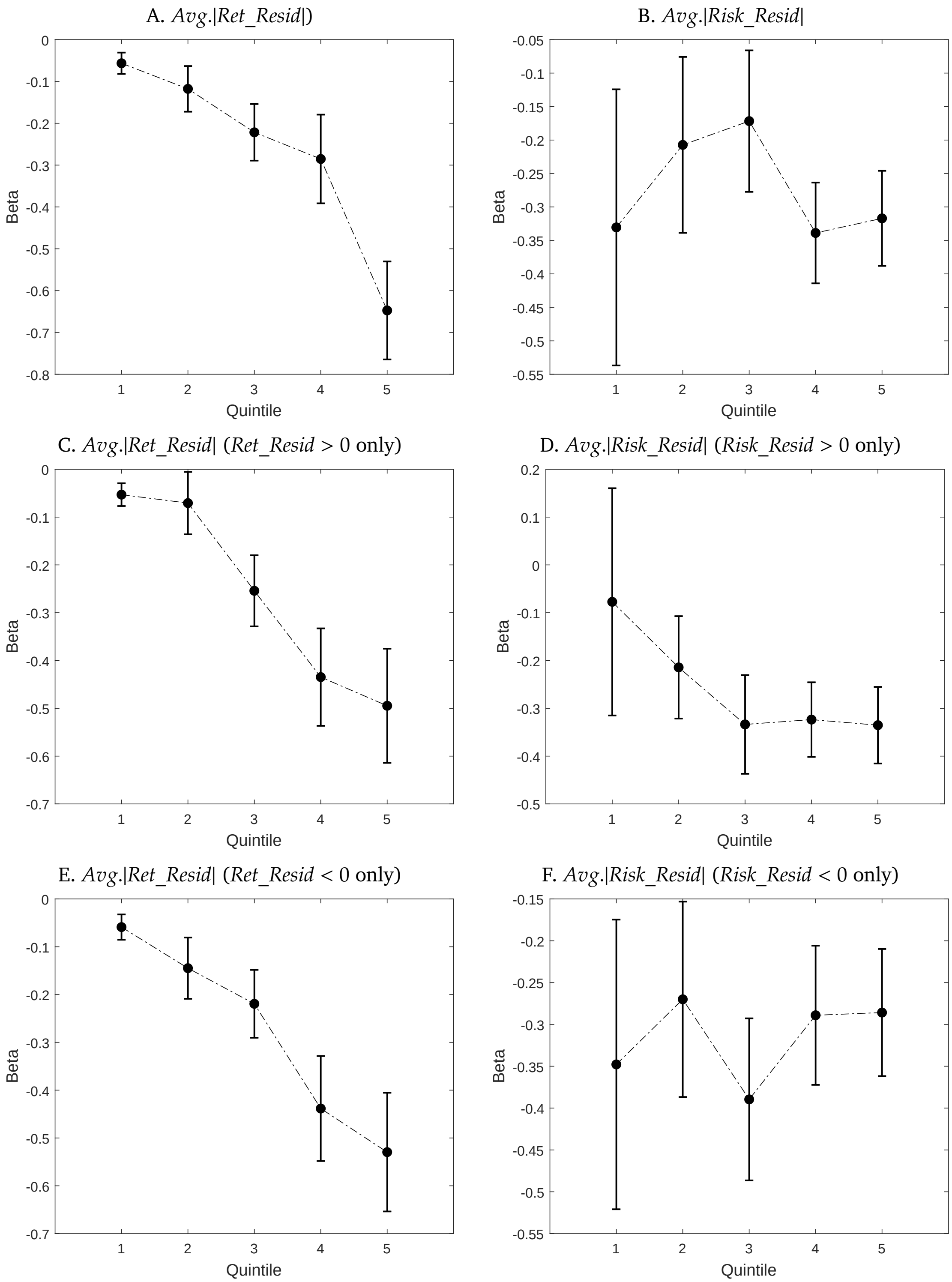

Figure 5. **Risk-Return Trade-offs By Asset-specific Preferences.** These figures show the point estimates and 95% confidence intervals of the risk-return trade-off coefficient by quintile. Panel A (B) sorts respondents into quintiles based on the absolute mean deviation of return (risk) perception across risky assets, where the deviation is measured by the residuals from the regression of returns on assets and individual dummies. Panel C (D) uses the absolute mean deviation of return (risk) perception, conditional on positive return (risk) deviation. Panel E (F) uses the absolute mean deviation of return (risk) perception, conditional on negative return (risk) deviation. Confidence intervals are computed based on standard errors clustered at the respondent level.

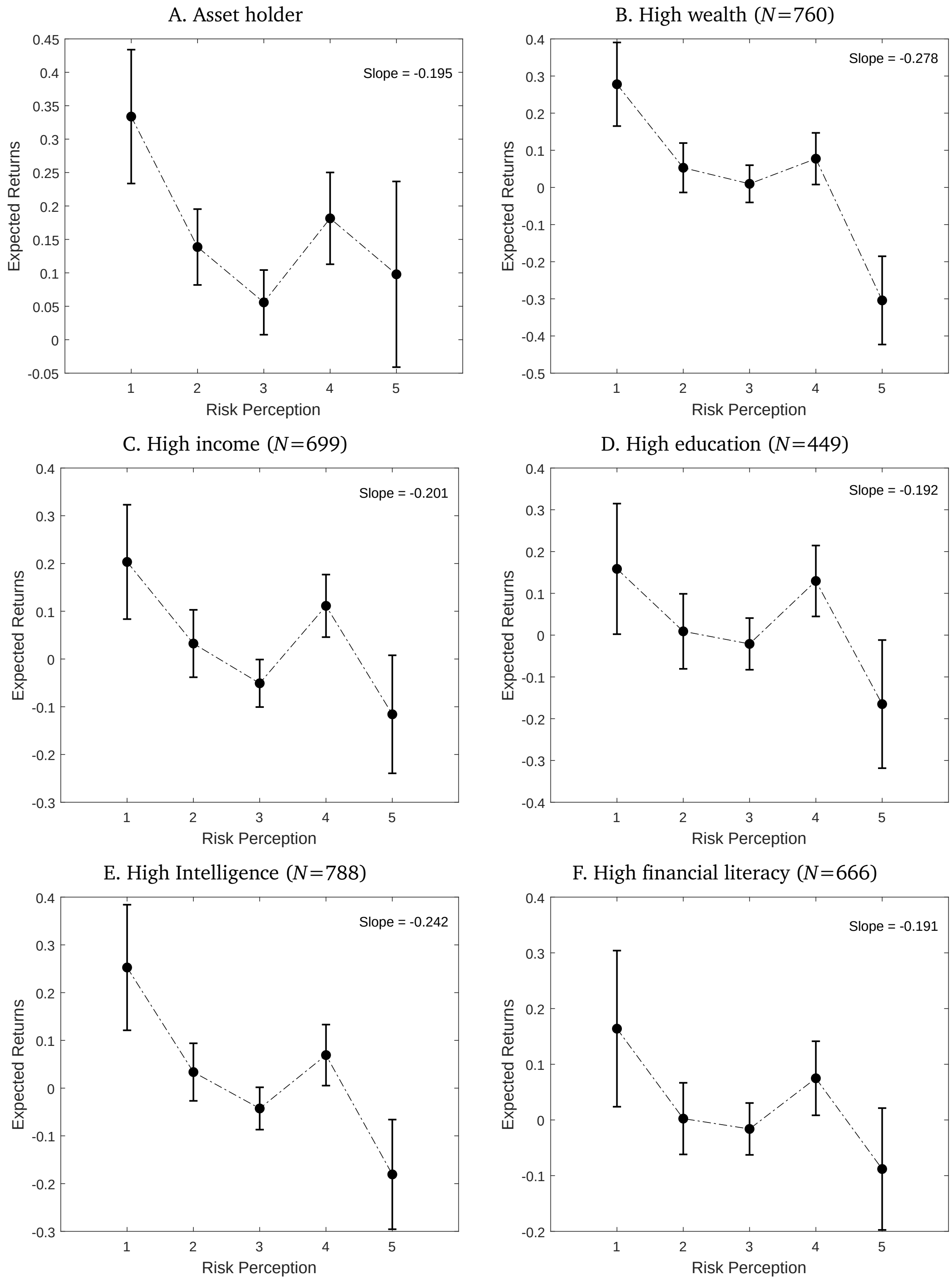

Figure 6. **Risk-Return Trade-offs By Group: Risky Assets.** These figures show the point estimates and 95% confidence intervals of expected returns for levels of risk perceptions by different groups, conditional on individual and asset-specific factors. A level of risk perception from 1 to 5 represents the following answers to the question about risk: 1 = very safe, 2 = safe, 3 = average, 4 = risky, and 5 = very risky. Confidence intervals are computed based on standard errors clustered at the respondent level.

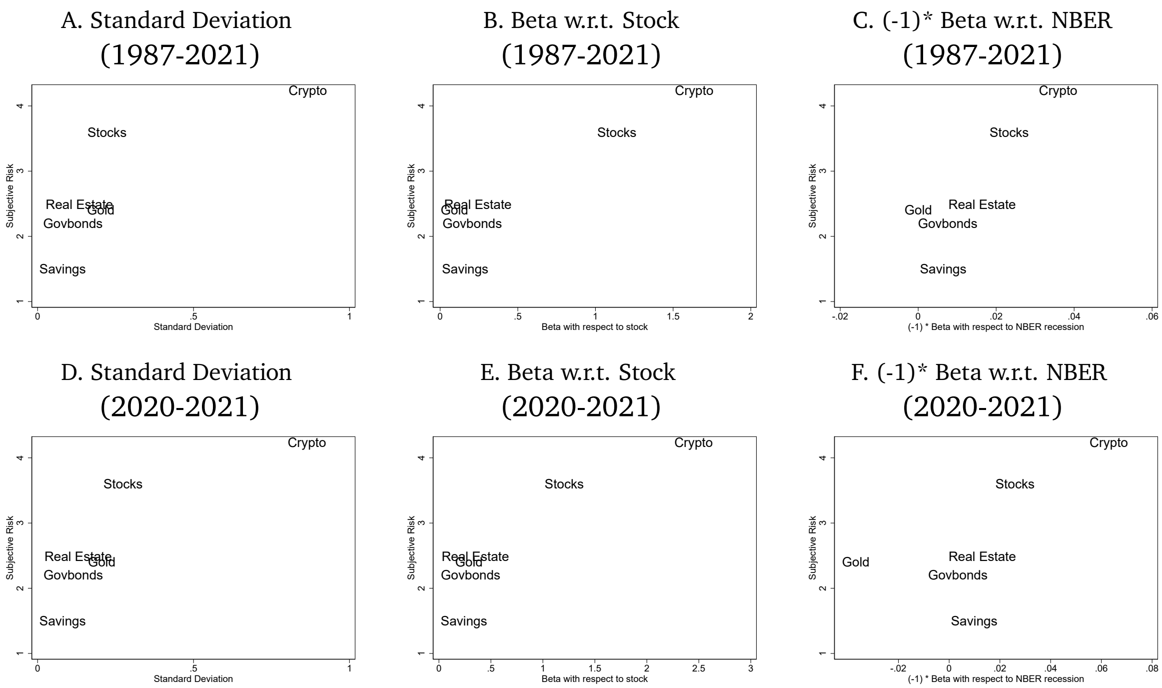

Figure 7. **Subjective risk VS Objective risk.** These figures plot the average of respondents' risk perception on a scale of 1 to 5 (y-axis) with objective risk measures based on the data (x-axis): standard deviation (Panel A and D), betas with respect to stock returns (CRSP value-weighted returns) (Panel B and E), and minus betas with respect to NBER recessions (Panel C and F). Historical data of six asset classes from January 1987 to December 2021 (January 2020 to December 2021) are used for Panels A, B, and C (D, E, and F). For six assets, the following data are used. (1) Savings: We assume zero for both first and second moments. (2) Stocks: CRSP value-weighted returns. (3) Real estate: S&P/Case-Shiller U.S. National Home Price Index. (4) Gold: gold price in USD per ounce from the Commodity Research Bureau. (5) Cryptocurrencies: Bitcoin from October 2014 to December 2021. (6) Government bonds: 30-day Treasury bill. All returns are converted to real values by subtracting the CPI rate from them.

Table 1. **Summary Statistics**

Panel A: Basic demographic information

Stats	Mean	SD	p10	p25	p50	p75	p90
Age	56.61	14.62	36	45	58	68	75
Gender	0.44	0.50	0	0	0	1	1
Married	0.62	0.48	0	0	1	1	1
HighSchool	0.22	0.41	0	0	0	0	1
Bachelor	0.60	0.49	0	0	1	1	1
Master	0.13	0.34	0	0	0	0	1
PhD	0.04	0.20	0	0	0	0	0
US Born	0.93	0.25	1	1	1	1	1

Panel B: Race

	Obs.	%		Obs.	%
White	2,137	84.1	Asian	63	2.48
Black	212	8.34	Islander	6	0.24
Native American	26	1.02	Mixed	97	3.82

Panel C: Labor Status

	Obs.	%		Obs.	%
Working	1,263	49.59	Retired	650	25.52
On sick or other leave	19	0.75	Disabled	179	7.03
Unemployed(layoff)	22	0.86	Other	130	5.10
Unemployed(looking)	71	2.79	Mixed	213	8.36

Panel D: Income

Category $	Obs.	%	Category ($)	Obs.	%
Less than 5,000	63	2.48	30,000 to 34,999	122	4.80
5,000 to 7,499	28	1.10	35,000 to 39,999	119	4.68
7,500 to 9,999	32	1.26	40,000 to 49,999	192	7.55
10,000 to 12,499	57	2.24	50,000 to 59,999	198	7.78
12,500 to 14,999	46	1.81	60,000 to 74,999	297	11.67
15,000 to 19,999	93	3.66	75,000 to 99,999	377	14.82
20,000 to 24,999	111	4.36	100,000 to 149,999	390	15.33
25,000 to 2,999	114	4.48	150,000 or more	305	11.99

Panel E: Asset holdings

	Savings		Stocks		Real Estate		Gold		Crypto		Gov Bonds	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%
I do not have this asset	594	23.62	1,572	62.53	1,062	42.19	2,282	90.59	2,346	93.1	2,220	88.13
$5,000 or less	756	30.06	196	7.80	28	1.11	168	6.67	143	5.67	159	6.31
$5,001 to $10,000	288	11.45	87	3.46	12	0.48	27	1.07	18	0.71	42	1.67
$10,001 to $30,000	364	14.47	126	5.01	42	1.67	26	1.03	5	0.2	36	1.43
$30,001 to $50,000	158	6.28	82	3.26	62	2.46	7	0.28	4	0.16	23	0.91
$50,001 to $200,000	272	10.82	210	8.35	446	17.72	6	0.24	2	0.08	23	0.91
$200,001 to $400,000	52	2.07	100	3.98	424	16.85	3	0.12	0	0.00	7	0.28
$400,001 or more	31	1.23	141	5.61	441	17.52	0	0.00	2	0.08	9	0.36

Note: This table reports summary statistics for basic demographic information (Panel A), race (Panel B), labor status (Panel C), income (Panel D), and asset holdings (Panel E). *Age* is the age of a respondent. *Gender* takes one for a male respondent. *Married* takes one for a married respondent. *HighSchool* takes one for a respondent whose highest education level is high school. *Bachelor* takes one for a respondent whose highest education level is a bachelor. *Master* takes one for a respondent whose highest education level is a master degree. *PhD* takes one for a respondent whose highest education level is a PhD degree. *US Born* takes one for a respondent who was born in the U.S.

Table 2. **Subjective Risk-Return Trade-offs (Pairwise regression).**

	Gov't Bonds	Real Estate	Gold	Stocks	Cryptocurrency
Savings	*0.0513**	0.007	**-0.187*****	*0.256****	0.040
	(0.030)	(0.030)	(0.034)	(0.030)	(0.043)
	[0.2]	[0.2]	[2.5]	[5.2]	[0.1]
Gov't Bonds		0.037	**-0.113*****	*0.310****	*0.118****
		(0.029)	(0.029)	(0.028)	(0.035)
		[0.1]	[1.4]	[9.5]	[1.6]
Real Estate			**-0.389*****	**-0.246*****	**-0.372*****
			(0.038)	(0.034)	(0.042)
			[9.6]	[4.3]	[8.7]
Gold				**-0.325*****	**-0.227*****
				(0.033)	(0.038)
				[7.6]	[4.6]
Stocks					**-0.315*****
					(0.047)
					[6.6]

Note: This table reports subjective pairwise risk-return trade-offs. We estimate the subjective risk-return trade-off $\beta^{j,k}$ across two asset classes j and k as follows:

$$Ret_i^{j,k} = \beta^{j,k} Risk_i^{j,k} + \gamma + \epsilon_i^{j,k}$$

$Ret_i^{j,k}$ and $Risk_i^{j,k}$ represent the subjective return and risk differences of asset j relative to asset k, for an individual i: $Ret_i^{j,k} = Ret_i^j - Ret_i^k$, $Risk_i^{j,k} = Risk_i^j - Risk_i^k$, where Ret_i^j and $Risk_i^j$ represent an individual i's subjective expected return and risk perception of an asset j. The coefficients in bold indicate the negative risk-return relations and the coefficients in italics indicate the positive relations with statistical significance. Robust standard errors are reported in parenthesis. R-squared for each regression is reported in squared parenthesis in percent. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 3. **Subjective Risk-Return Trade-offs (Pooled regression)**

	(1)	(2)	(3)	(4)	(5)	(6)
Risk perception	-0.301***	-0.272***			-0.187***	-0.197***
	(0.022)	(0.016)			(0.026)	(0.025)
Price stability			-0.077***	-0.044*	-0.028	0.020
			(0.023)	(0.023)	(0.024)	(0.024)
Inflation			-0.239***	-0.304***	-0.199***	-0.245***
			(0.024)	(0.025)	(0.025)	(0.026)
Liquidity			-0.124***	-0.005	-0.110***	0.007
			(0.018)	(0.017)	(0.019)	(0.017)
Cash flow			-0.098***	-0.118***	-0.097***	-0.122***
			(0.017)	(0.016)	(0.017)	(0.017)
Tangibility			0.016	-0.026*	0.026*	0.019
			(0.015)	(0.013)	(0.016)	(0.014)
Asset dummies	Yes	No	Yes	No	Yes	No
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	5,500	5,500	4,618	4,618	4,506	4,506
Adjusted-R^2	0.445	0.396	0.472	0.420	0.474	0.428

Note: This table shows subjective risk-return trade-offs in a pooled regression setting. We run the following regression:

$$Ret_i^k = \beta Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k,$$

where Ret_i^k and $Risk_i^k$ represent an individual i's subjective expected return and risk perception of an asset k. γ_i represents individual dummies. ϕ_k represents asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 4. **Asset-specific Preferences: Trust of U.S. Firms and Risk/Return Perception**

	(1) Return	(2) Risk	(3) Return	(4) Risk
	Panel A: Stocks			
Integrity	0.266***	-0.094***		
	(0.030)	(0.025)		
Ability			0.364***	-0.045*
			(0.029)	(0.025)
Observations	1,689	1,689	1,689	1,689
R-squared	0.051	0.010	0.097	0.002
	Panel B: Gold			
Integrity	-0.050	-0.004		
	(0.043)	(0.032)		
Ability			0.023	-0.022
			(0.042)	(0.032)
Observations	1,314	1,314	1,314	1,314
R-squared	0.001	0.000	0.000	0.000
	Panel C: Stocks minus Gold			
Integrity	0.302***	-0.077*		
	(0.049)	(0.043)		
Ability			0.310***	-0.027
			(0.046)	(0.041)
Observations	1,215	1,215	1,215	1,215
R-squared	0.035	0.003	0.038	0.000

Note: This table reports the relationship between the trust of U.S. firms and the expected return or subjective risk:

$$Ret_i^k = \beta^k Trust_i + \epsilon_i^k,$$

$$Risk_i^k = \beta^k Trust_i + \epsilon_i^k,$$

where Ret_i^k (reported in Columns (1) and (3)) and $Risk_i^k$ (reported in Columns (2) and (4)) represent an individual *i*'s subjective expected return and risk perception of an asset *k*. $Trust_i$ represents an individual *i*'s beliefs on the integrity of U.S firms (Integrity) reported in Columns (1) and (2), and companies' capability of creating value for their investors (Ability) reported in Columns (3) and (4). Asset *k* is stocks in Panel A and gold in Panel B. In Panel C, we regress the differences in subjective returns and risk between stocks and gold on the trust of firms. Robust standard errors are reported. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 5. **Heterogeneity of Risk-Return Trade-offs**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Risk perception	-0.301***	-0.325***	-0.315***	-0.350***	-0.331***	-0.335***	-0.356***	-0.400***
	(0.022)	(0.022)	(0.026)	(0.025)	(0.023)	(0.025)	(0.025)	(0.028)
Risk perception × Asset holder		0.130***						0.123***
		(0.012)						(0.012)
Risk perception × High wealth			0.037					-0.063*
			(0.033)					(0.034)
Risk perception × High income				0.149***				0.095***
				(0.033)				(0.035)
Risk perception × High edu					0.139***			0.063
					(0.041)			(0.040)
Risk perception × High intelligence						0.093***		0.042
						(0.033)		(0.034)
Risk perception × High financial literacy							0.165***	0.119***
							(0.033)	(0.036)
Asset dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500
Adjusted-R^2	0.445	0.463	0.445	0.449	0.448	0.446	0.450	0.470

Note: This table shows heterogeneous subjective risk-return trade-offs in a pooled regression setting. We run the following regression:

$$Ret_i^k = \beta_1 Risk_i^k + \beta_2 Risk_i^k \times Z_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k,$$

where Ret_i^k and $Risk_i^k$ represent an individual i's subjective expected return and risk perception of an asset k. γ_i represents individual dummies. ϕ_k represent asset dummies. Z_i^k includes the following variables: *Asset holder* takes one for a positive holding for an asset class (respondent and asset specific). *High wealth* takes one for a respondent whose total asset value is within the top 30% (respondent specific). *High income* takes one for a respondent's income greater than or equal to $100,000. *High edu* takes one for a master's degree or a PhD degree. *High intelligence* takes one for the top 30% highest intelligence score measured using number series, picture vocabulary, and verbal analogies. *High financial literacy* takes one for the top 30% highest financial literacy score, which is between 0 and 14. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 6. **Subjective Risk Perception**

	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A: Individual and asset dummies			
Price stability	0.413***					0.294***
	(0.019)					(0.022)
Inflation		0.402***				0.256***
		(0.019)				(0.021)
Liquidity			0.177***			0.074***
			(0.016)			(0.017)
Cash flow				0.057***		0.025
				(0.018)		(0.017)
Tangibility					0.174***	0.080***
					(0.015)	(0.016)
Asset dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	6,790	6,155	6,636	6,292	6,834	5,464
Adjusted-R^2	0.355	0.350	0.273	0.264	0.283	0.409
			Panel B: Individual dummies only			
Price stability	0.414***					0.292***
	(0.019)					(0.022)
Inflation		0.402***				0.256***
		(0.019)				(0.021)
Liquidity			0.178***			0.075***
			(0.016)			(0.017)
Cash flow				0.056***		0.024
				(0.018)		(0.017)
Tangibility					0.174***	0.083***
					(0.015)	(0.016)
Asset dummies	No	No	No	No	No	No
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	6,790	6,155	6,636	6,292	6,834	5,464
Adjusted-R^2	0.353	0.348	0.272	0.262	0.283	0.406

Note: This table shows how beliefs about asset attributes are associated with subjective risk perception. We run the following regression:

$$Risk_i^k = \beta_1 \text{Price stability}_i^k + \beta_2 \text{Inflation}_i^k + \beta_3 \text{Liquidity}_i^k + \beta_4 \text{Cash flow}_i^k + \beta_5 \text{Tangibility}_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k.$$

where $Risk_i^k$ represents an individual i's subjective risk perception of an asset k. γ_i represents individual dummies. ϕ_k represents asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 7. **Asset Market Participation and Subjective Return and Risk**

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Effect		Extensive margin		Intensive margin	
Expected returns	0.053***		0.070***		0.064***	
	(0.006)		(0.008)		(0.009)	
Risk perception	-0.013*		-0.030***		-0.005	
	(0.008)		(0.010)		(0.013)	
Returns/Risk ratio		0.045***		0.056***		0.042***
		(0.007)		(0.009)		(0.011)
Asset dummies	Yes	Yes	Yes	Yes	Yes	Yes
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	4,160	4,160	4,160	4,160	1,774	1,774
Adjusted-R^2	0.331	0.321	0.347	0.332	0.368	0.349

Note: This table shows how returns and risk perceptions are associated with asset market participation decisions. We run the following regression:

$$y_i^k = \beta_1 Ret_i^k + \beta_2 Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k, \qquad y_i^k = \beta Ret_i^k / Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k,$$

where in Columns (1) and (2), y_i^k is the share of each risky asset in the total value of risky assets. In Columns (3) and (4), $y_i^k = \mathbb{1}\{\text{Asset Holding} > 0\}_i^k$ is an indicator that takes one for a positive holding of an asset k for an individual i. In Columns (5) and (6), y_i^k is the share of each risky asset, conditional on the positive share of each risky asset. γ_i represents individual dummies. ϕ_k represent asset dummies. All regressions include both individual and asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table 8. **Asset Under-diversification and Risk-Return trade-offs**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number of securities				HHI			
Risk-Return Tradeoff	0.104***	0.046**			-0.033***	-0.024***		
(# of Risky Assets >= 2)	(0.030)	(0.021)			(0.007)	(0.007)		
Risk-Return Tradeoff			0.090**	0.034			-0.029***	-0.023**
(# of Risky Assets >= 3)			(0.039)	(0.029)			(0.009)	(0.009)
Individual controls	No	Yes	No	Yes	No	Yes	No	Yes
Race dummies	No	Yes	No	Yes	No	Yes	No	Yes
Income class dummies	No	Yes	No	Yes	No	Yes	No	Yes
Labor status dummies	No	Yes	No	Yes	No	Yes	No	Yes
Education dummies	No	Yes	No	Yes	No	Yes	No	Yes
N	1,705	1,510	1,270	1,098	1,319	1,306	934	922
Adjusted-R^2	0.006	0.428	0.003	0.437	0.013	0.144	0.009	0.124

Note: This table shows the relation between asset under-diversification and subjective risk-return trade-offs. We run the following cross-sectional regression:

$$y_i = \beta \text{ Risk-return tradeoff}_i + \delta' X_i + \mu + \epsilon_i, ,$$

where in Columns (1), (2), (3), and (4), y_i is Herfindahl-Hirschman Index (HHI) defined as the sum of squared each risky asset share and in Columns (4), (5), (6), and (7), y_i is the number of risky asset classes that each individual holds. Risk-return tradeoff$_i$ is estimated by running a regression of expected returns on risk perception among risky assets for each respondent. X_i denotes individual controls that are the log of wealth, intelligence score, financial literacy score, trust of government, fund, and firm in terms of ability and integrity, age, age squared, gender dummy, dummy taking one for US-born respondents as well as race, income, labor status, and education dummies. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Online Appendix to Subjective Risk-Return Trade-off

April 25, 2024

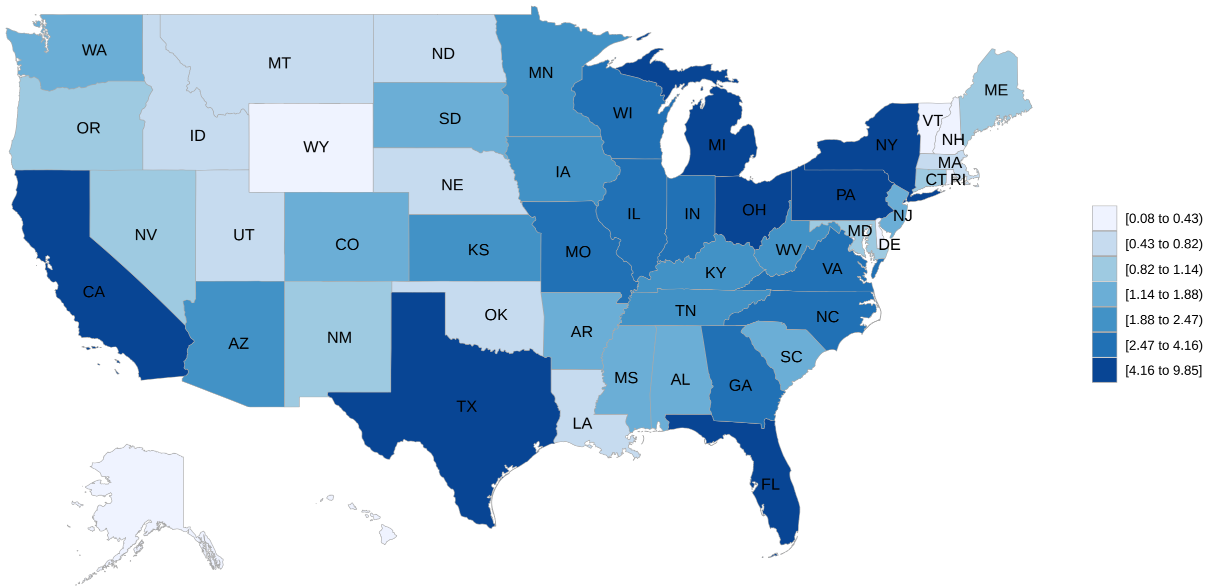

Figure IA1. **States of Residence.** This figure displays a heatmap that represents the fraction of the states of residence of 2,548 UAS 444 respondents.

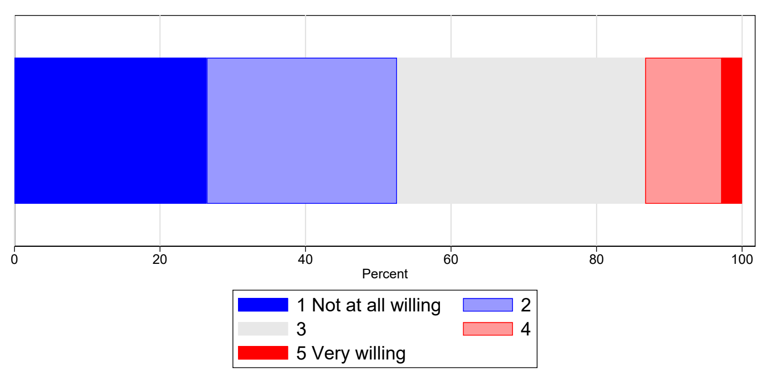

Figure IA2. **Risk tolerance.** This figure shows the frequency of respondents' answers to the following question about risk aversion: How willing are you to take investment risks? On a scale of 1 to 5 with 1: "I would avoid financial risks as much as possible", and 5: "I am excited to take financial risks". Note: Financial risk refers to the possibility of losing some or all of original investment.

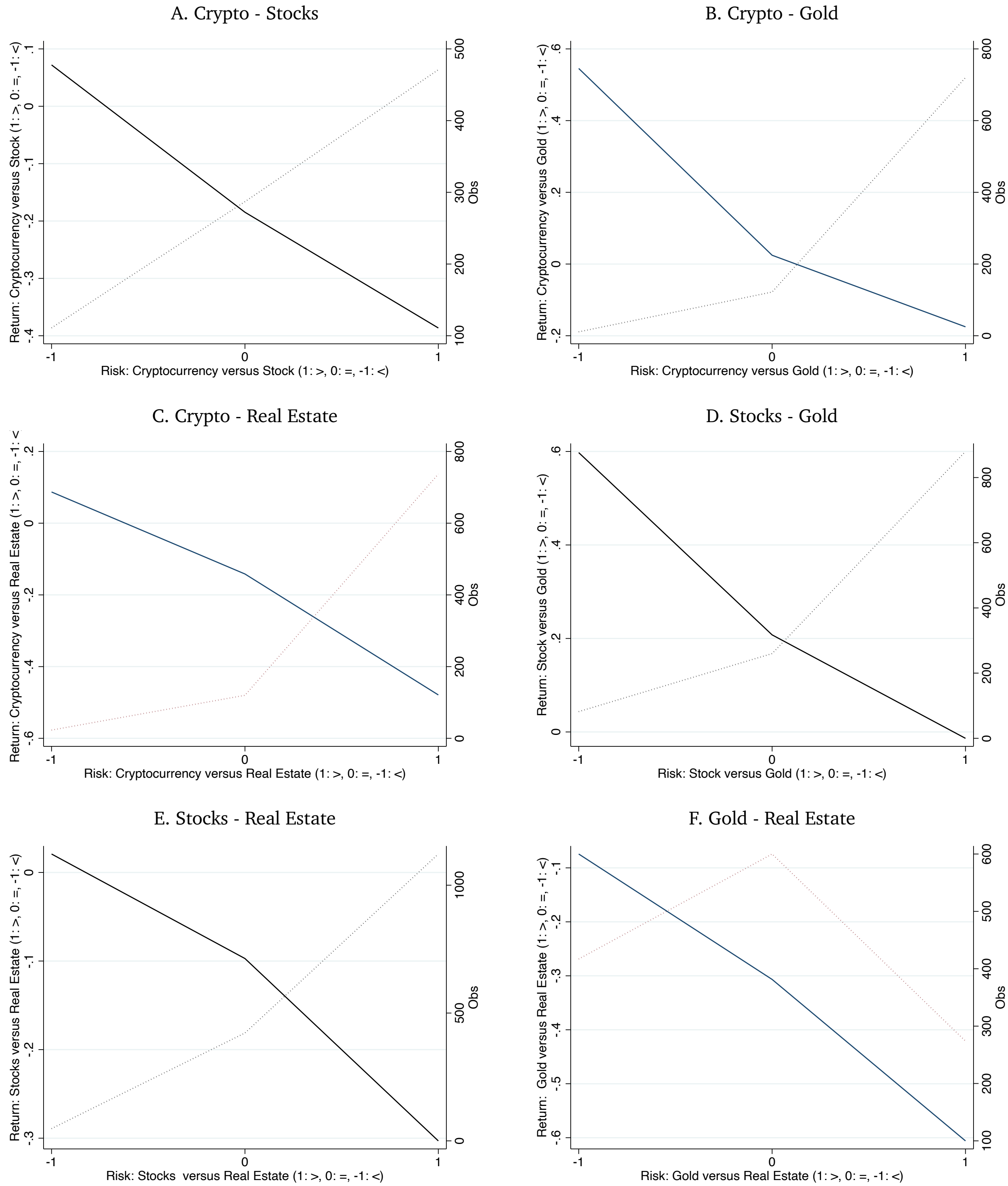

Figure IA3. **Subjective Risk-Return Trade-off Among Risky Assets.** The sample contains all individuals who respond to subjective risk and return for both assets j and k. The solid line plots the average relative subjective return $Ret_i^{j,k}$ for each level of relative risk perceptions $Risk^{j,k}$ where $Ret_i^{j,k} = sign(Ret_i^j - Ret_i^k)$ and $Risk_i^{j,k} = sign(Risk_i^j - Risk_i^k)$. The dotted line plots the number of valid responses for each data point.

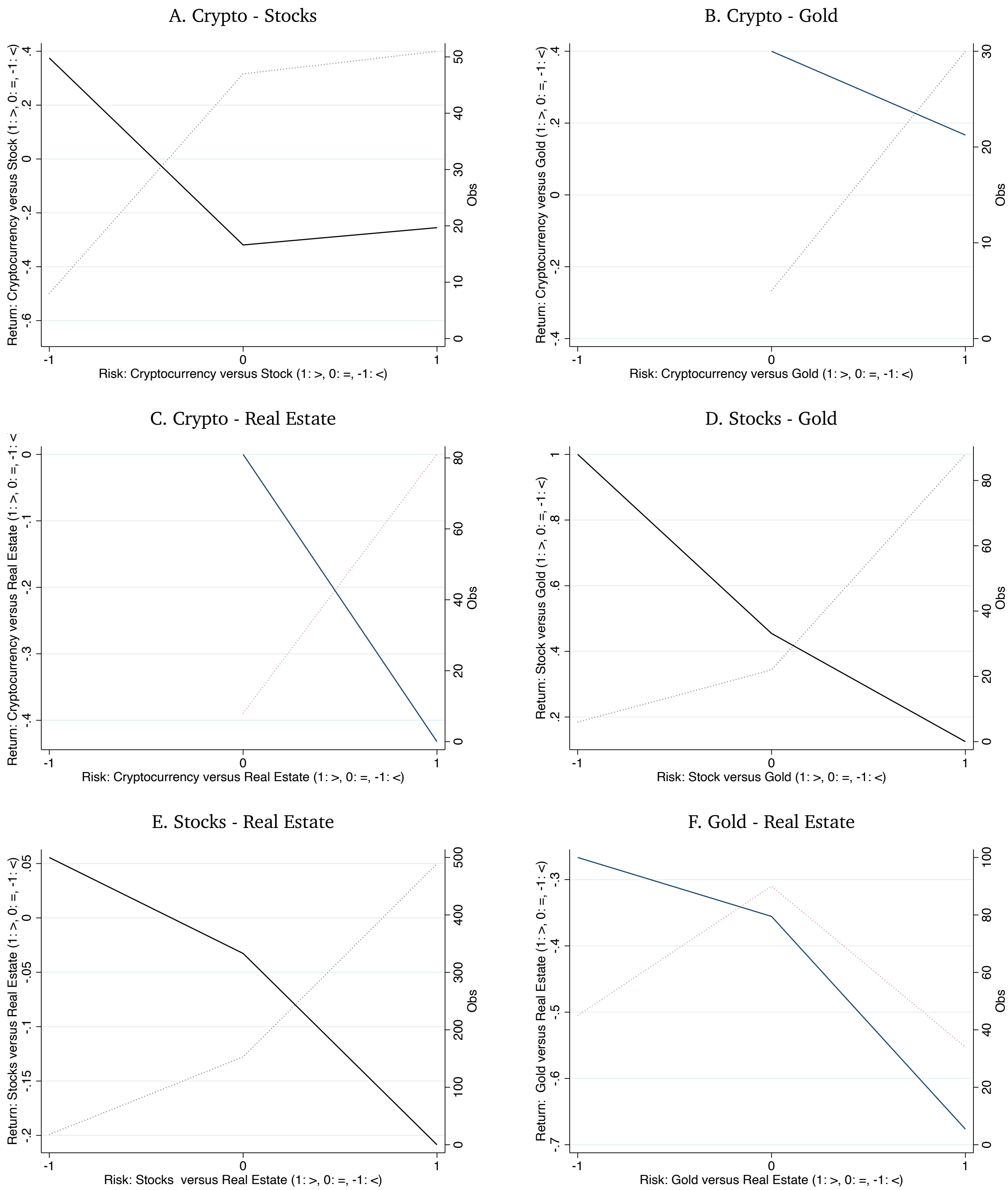

Figure IA4. **Subjective Risk-Return Trade-off Among Risky Assets — Asset holders Only.** The sample contains all individuals who own both assets j and k and respond to subjective risk and return for both assets j and k. The solid line plots the average relative subjective return $Ret_i^{j,k}$ for each level of relative risk perceptions $Risk^{j,k}$ where $Ret_i^{j,k} = sign(Ret_i^j - Ret_i^k)$ and $Risk_i^{j,k} = sign(Risk_i^j - Risk_i^k)$. The dotted line plots the number of valid responses for each data point.

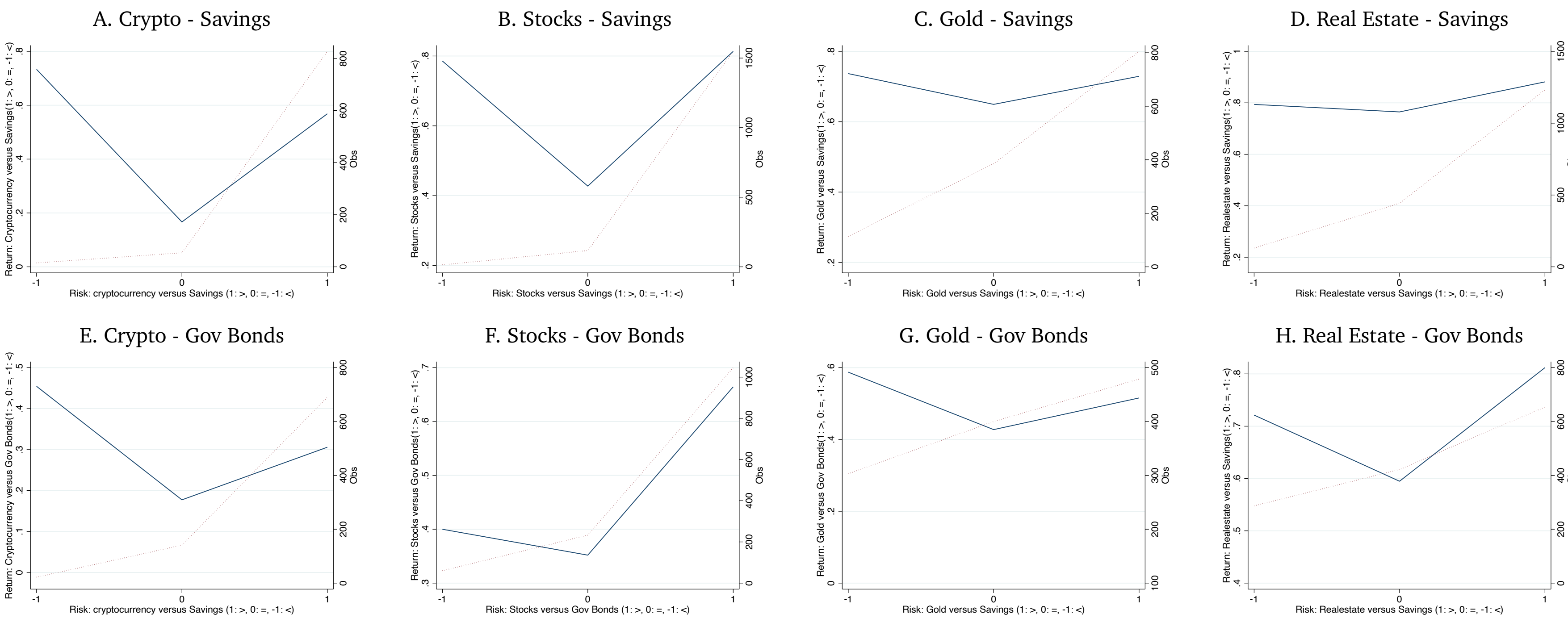

Figure IA5. **Subjective Risk-Return Trade-off Between Risky and Risk-free Assets.** The sample contains all individuals who respond to subjective risk and return for both assets j and k. The solid line plots the average relative subjective return $Ret_i^{j,k}$ for each level of relative risk perceptions $Risk^{j,k}$ where $Ret_i^{j,k} = sign(Ret_i^j - Ret_i^k)$ and $Risk_i^{j,k} = sign(Risk_i^j - Risk_i^k)$. The dotted line plots the number of valid responses for each data point.

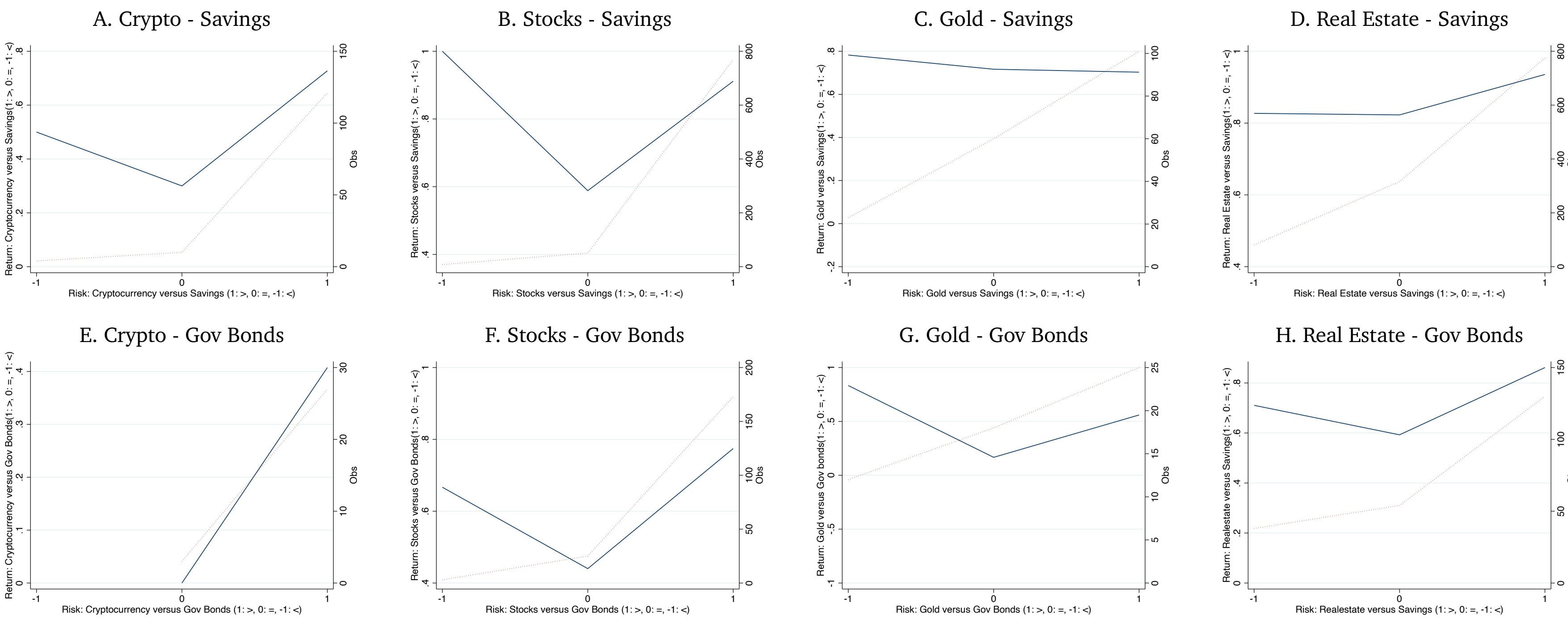

Figure IA6. **Subjective Risk-Return Trade-off Between Risky and Risk-free Assets — Asset Holders Only.** The sample contains all individuals who own both assets j and k and respond to subjective risk and return for both assets j and k. The solid line plots the average relative subjective return $Sign(Ret_i^{j,k})$ for each level of relative risk perceptions $Sign(Risk_i^{j,k})$ where $Sign(Ret_i^{j,k}) = sign(Ret_i^j - Ret_i^k)$ and $Sign(Risk_i^{j,k}) = sign(Risk_i^j - Risk_i^k)$. The dotted line plots the number of valid responses for each data point.

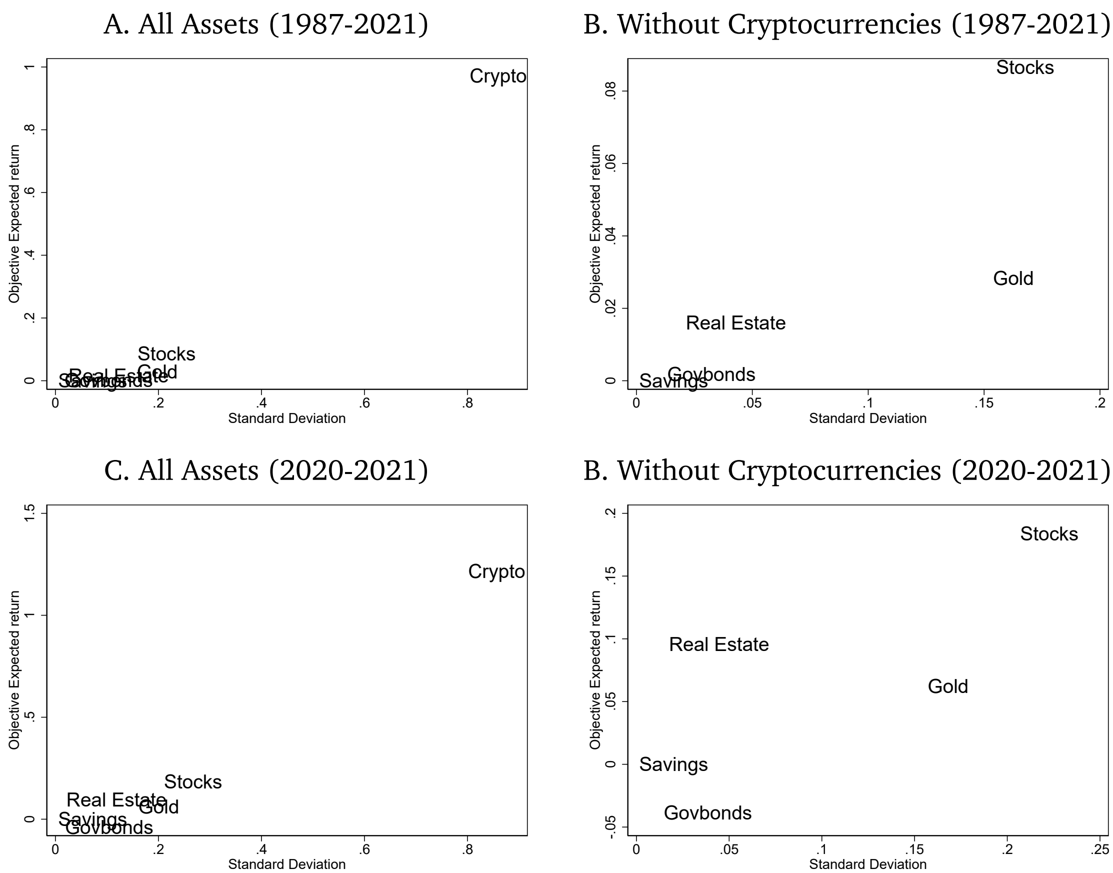

Figure IA7. **Objective Risk-Return Trade-offs (Standard Deviation).** These figures plot the first and second moments of the historical data of six asset classes from January 1987 to December 2021 in Panels A and B, and from January 2020 to December 2021 in Panels C and D. For six assets, the following data are used. (1) Savings: We assume zero for both first and second moments. (2) Stocks: CRSP value-weighted returns. (3) Real estate: S&P/Case-Shiller U.S. National Home Price Index. (4) Gold: gold price in USD per ounce from the Commodity Research Bureau. (5) Cryptocurrencies: Bitcoin from October 2014 to December 2021. (6) Government bonds: 30-day Treasury bill. All returns are converted to real values by subtracting the CPI rate from them.

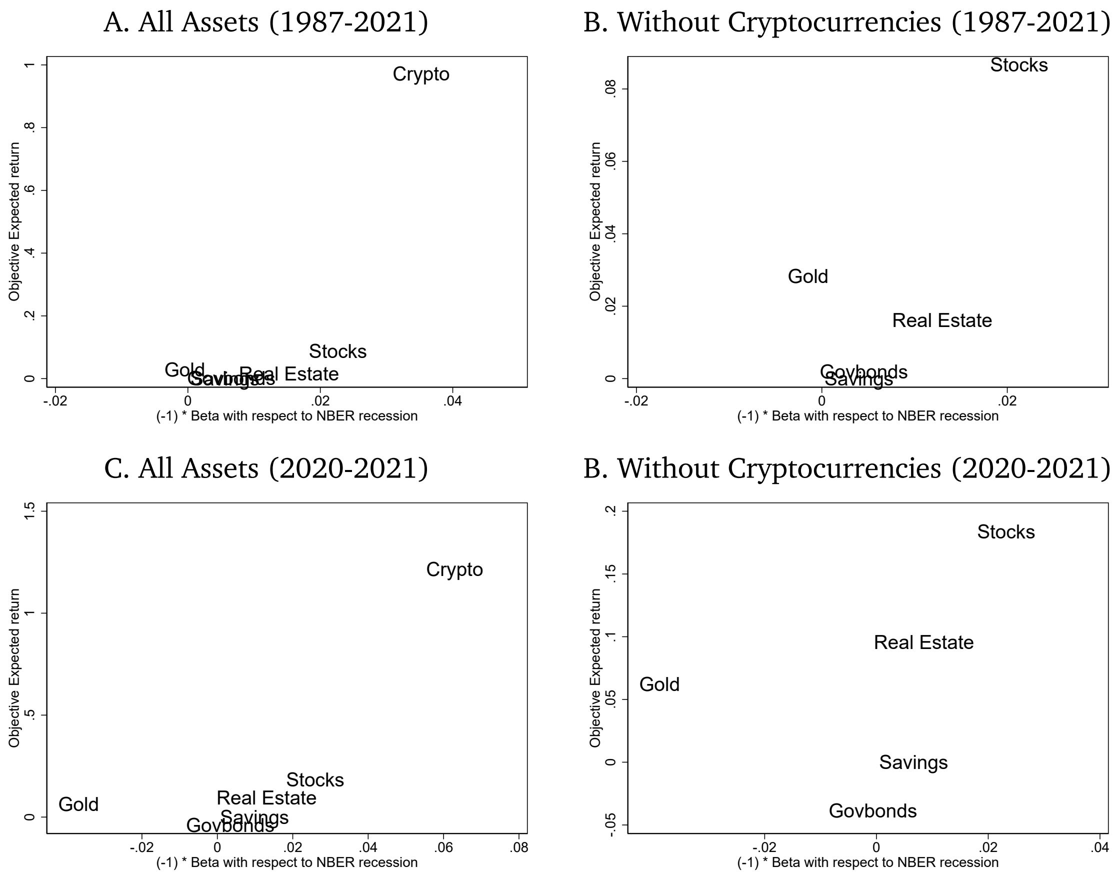

Figure IA8. **Objective Risk-Return Trade-offs (Betas to NBER Recession).** These figures plot average returns and betas with respect to NBER recessions for six asset classes using the data from January 1987 to December 2021 in Panels A and B, and from January 2020 to December 2021 in Panels C and D. We take a negative of betas. For six assets, the following data are used. (1) Savings: We assume zero for both first and second moments. (2) Stocks: CRSP value-weighted returns including dividends. (3) Real estate: S&P/Case-Shiller U.S. National Home Price Index. (4) Gold: gold price in USD per ounce from the Commodity Research Bureau. (5) Cryptocurrencies: Bitcoin from October 2014 to December 2021. (6) Government bonds: 30-day Treasury bill. All returns are converted to real values by subtracting the CPI rate from them.

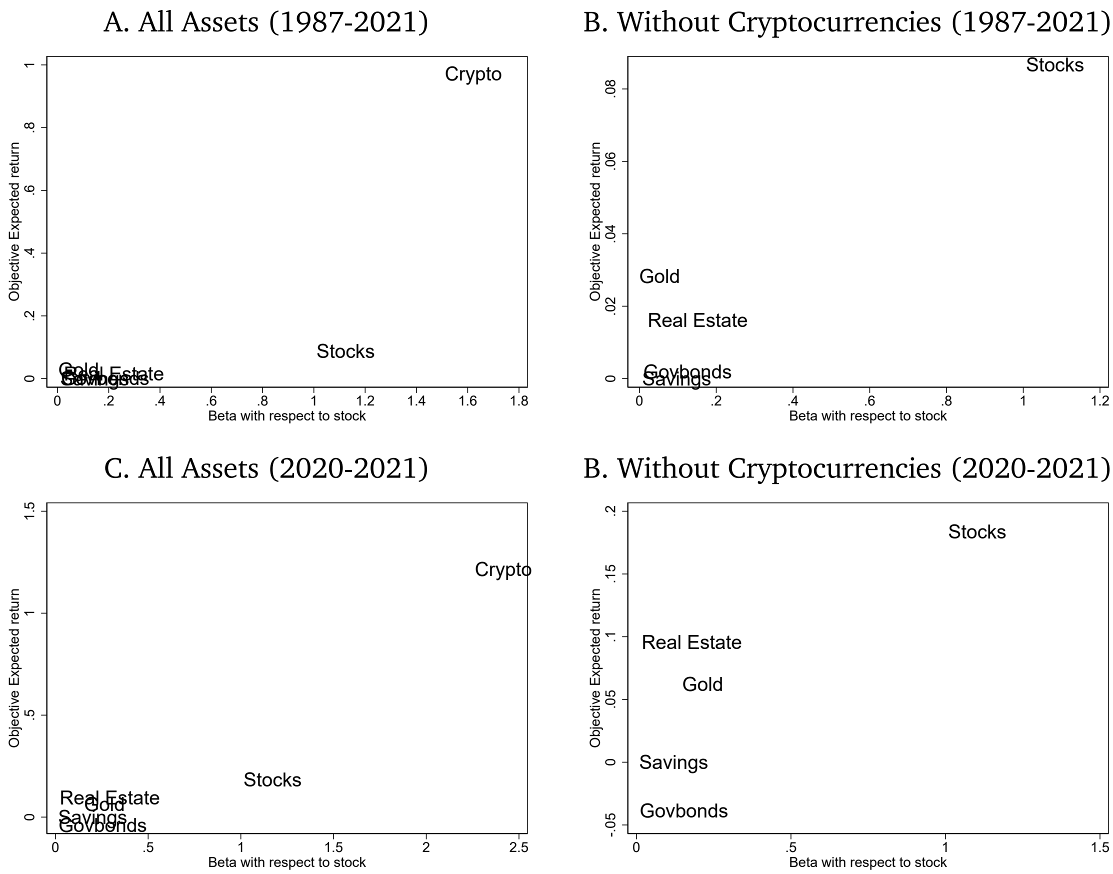

Figure IA9. **Objective Risk-Return Trade-offs (Betas to stock market).** These figures plot average returns and betas with respect to stock returns (CRSP value-weighted returns) for six asset classes using the data from January 1987 to December 2021 in Panels A and B, and from January 2020 to December 2021 in Panels C and D. For six assets, the following data are used. (1) Savings: We assume zero for both first and second moments. (2) Stocks: CRSP value-weighted returns including dividends. (3) Real estate: S&P/Case-Shiller U.S. National Home Price Index. (4) Gold: gold price in USD per ounce from the Commodity Research Bureau. (5) Cryptocurrencies: Bitcoin from October 2014 to December 2021. (6) Government bonds: 30-day Treasury bill. All returns are converted to real values by subtracting the CPI rate from them.

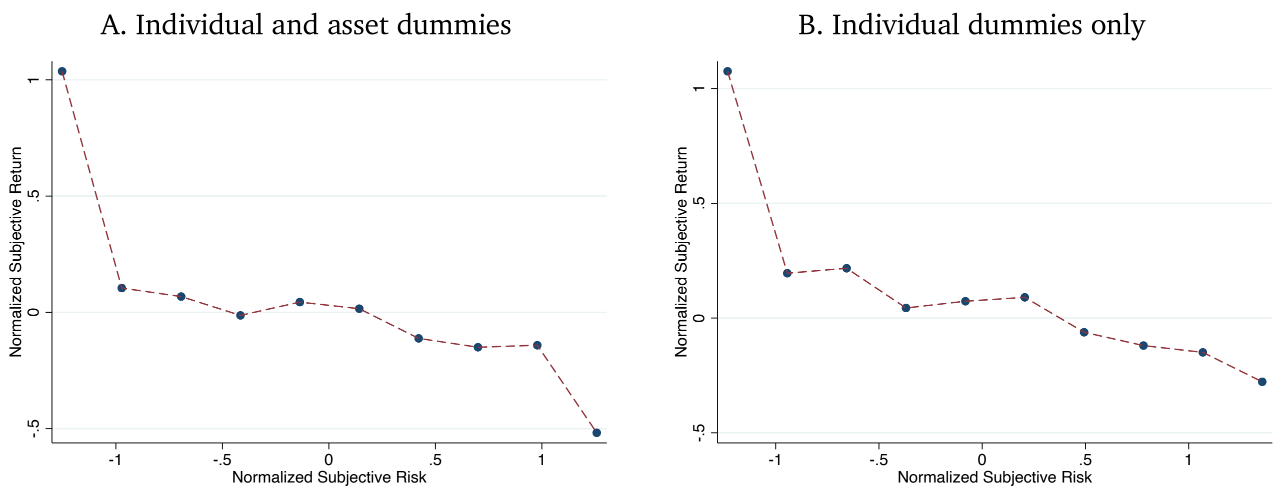

Figure IA10. **Risk-Return Trade-offs Among Risky Assets — Hong Kong Survey.** These figures plot the relationship between the normalized expected returns and the normalized subjective risk, based on the Hong Kong survey. In Panel A, subjective risk and returns are normalized with individual and asset-specific dummies. In Panel B, subjective risk and returns are normalized with individual dummies only.

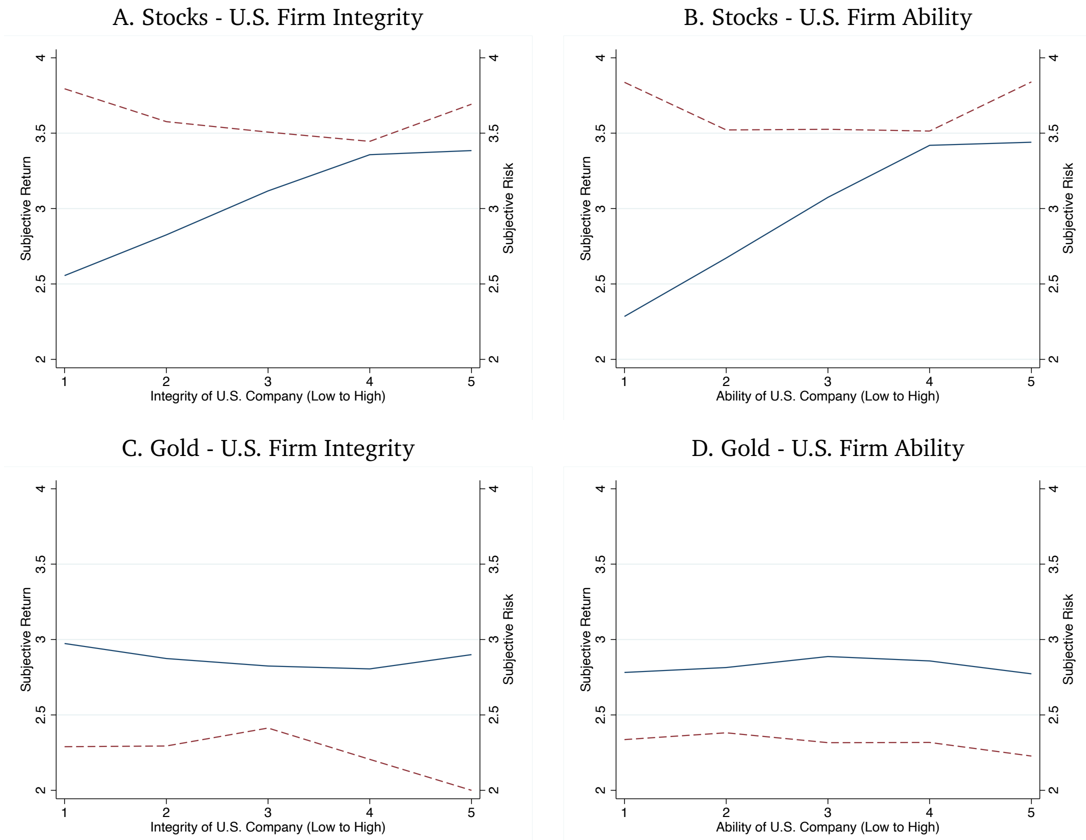

Figure IA11. **Risk and Return Perception by Trust in U.S. Firms** This figure shows how subjective risk (red dashed) and expected return (blue straight) correlate with the trust in U.S. firms for stocks in Panels A and B, and gold in Panels C and D. In Panels A and C, trust is measured by the perception of the integrity of U.S. companies on a scale from 1 to 5. In Panels B and D, trust is measured by the perception of companies' capability of creating value for their investors on a scale from 1 to 5. 1 refers to "not trusting at all," and 5 refers to "completely trusting".

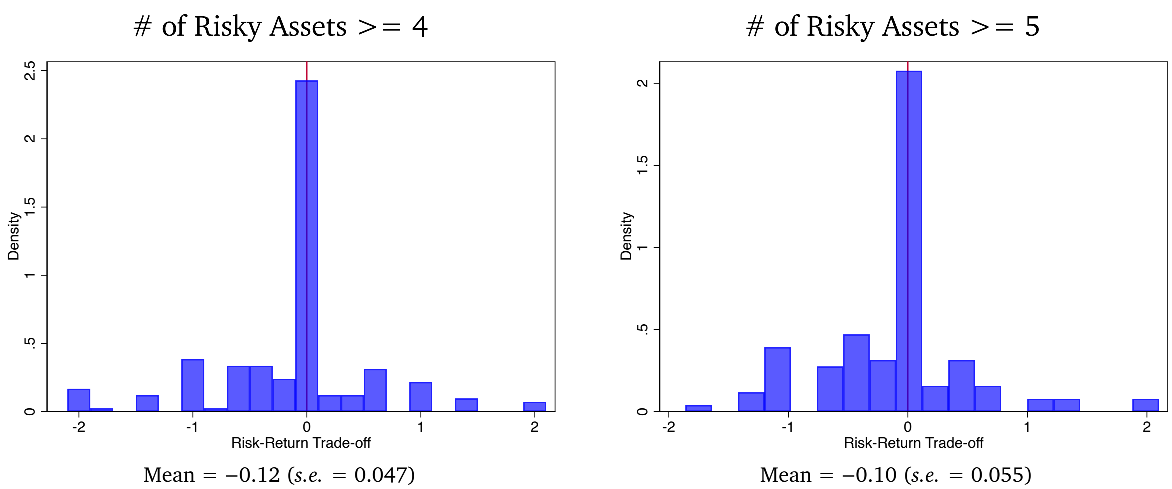

Figure IA12. **Distribution of Individual Risk-Return Trade-off — Hong Kong Survey.** These figures plot the distributions of individual degree of risk-return trade-off, based on the Hong Kong survey. The individual degree of risk-return trade-off is estimated by running a regression of expected returns on risk perception among risky assets for each respondent. In the left (right) panel, the minimum number of risky assets to estimate the risk-return trade-off is four (five). The left panel is based on 208 respondents, and the right panel is based on 116 respondents.

Table IA1. **Pairwise Risk-Return Trade-offs**

	Gov't Bonds	Real Estate	Gold	Stocks	Cryptocurrency
Savings	*0.108****	*0.072****	0.027	*0.262****	*0.141***
	(0.029)	(0.018)	(0.023)	(0.052)	(0.069)
Gov't Bonds		*0.069****	-0.026	*0.214****	0.044
		(0.017)	(0.023)	(0.035)	(0.045)
Real Estate			**-0.262*****	**-0.190*****	**-0.312*****
			(0.027)	(0.037)	(0.056)
Gold				**-0.266*****	**-0.248*****
				(0.034)	(0.054)
Stocks					**-0.230*****
					(0.037)

Note: This table reports subjective risk-return trade-offs based on a pair of two assets. We estimate the subjective risk-return trade-off $\beta^{j,k}$ across two asset classes j and k as follows:

$$Sign(Ret_i^{j,k}) = \beta^{j,k} Sign(Risk_i^{j,k}) + \gamma + \epsilon_i^{j,k}$$

where $Ret_i^{j,k}$ and $Risk_i^{j,k}$ represent the subjective return and risk of asset j relative to asset k, for individual i: $Sign(Ret_i^{j,k}) = Sign(Ret_i^j - Ret_i^k)$ and $Sign(Risk_i^{j,k}) = Sign(Risk_i^j - Risk_i^k)$ where Ret_i^j and $Risk_i^j$ represent an individual i's subjective expected return and risk perception of an asset j. $Sign()$ is the sign function that takes either -1, 0, or -1 depending on the sign. The coefficients in bold indicate the negative risk-return relations, and coefficients in italic indicate the positive relations with statistical significance. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA2. **Pairwise Risk-Return Trade-offs — Asset Holders**

	Gov't Bonds	Real Estate	Gold	Stocks	Cryptocurrency
Panel A: Subjective Risk/Return Orders					
Savings	*0.122***	*0.079****	-0.033	*0.178****	*0.229*
	(0.061)	(0.019)	(0.055)	(0.059)	(0.166)
Gov't Bonds		*0.109***	-0.070	*0.238***	*0.407****
		(0.046)	(0.101)	(0.115)	(0.146)
Real Estate			**-0.196*****	**-0.160*****	-0.432
			(0.078)	(0.063)	(0.267)
Gold				**-0.391*****	-0.233
				(0.091)	(0.269)
Stocks					-0.141
					(0.125)
Panel B: Subjective Risk/Return Differences					
	Gov't Bonds	Real Estate	Gold	Stocks	Cryptocurrency
Savings	*0.176***	0.019	**-0.317*****	*0.253****	0.081
	(0.089)	(0.035)	(0.110)	(0.041)	(0.122)
	[0.2]	[0.0]	[6.0]	[6.0]	[0.7]
Gov't Bonds		0.084	**-0.243***	*0.351****	0.127
		(0.072)	(0.136)	(0.074)	(0.148)
		[0.7]	[4.3]	[9.0]	[1.7]
Real Estate			**-0.383*****	**-0.191*****	**-0.357****
			(0.130)	(0.054)	(0.156)
			[7.2]	[2.3]	[7.0]
Gold				**-0.205***	-0.032
				(0.111)	(0.165)
				[2.4]	[0.1]
Stocks					-0.059
					(0.147)
					[0.2]

Note: This table reports subjective pairwise risk-return trade-offs. For each asset pair (j, k), only individuals with positive holdings in both assets are included in the sample. Panel A reports risk-return trade-off $\beta^{j,k}$ estimated with risk and return sign functions:

$$Sign(Ret_i^{j,k})Ret_i^{j,k} = \beta^{j,k} Sign(Risk_i^{j,k}) + \gamma + \epsilon_i$$

Panel B reports risk-return trade-off $\beta^{j,k}$ estimated with risk and return differences:

$$Ret_i^{j,k} = \beta^{j,k} Risk_i^{j,k} + \gamma + \epsilon_i$$

$Ret_i^{j,k}$ and $Risk_i^{j,k}$ represent the subjective return and risk differences of asset j relative to asset k, for an individual i: $Ret_i^{j,k} = Ret_i^j - Ret_i^k$ and $Risk_i^{j,k} = Risk_i^j - Risk_i^k$. Ret_i^j and $Risk_i^j$ represent an individual i's subjective expected return and risk perception of an asset j. The coefficients in bold indicate the negative risk-return relations, and coefficients in italic indicate the positive relations with statistical significance. Robust standard errors are reported in parenthesis. R-squared in percentage for each regression is reported in squared parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA3. **Distribution of Individual Risk-return Trade-off**

	Mean	SD	p10	p25	p50	p75	p90
Risk-Return Tradeoff (# of Risky Assets >= 2)	-0.23	0.74	-1.00	-0.60	0.00	0.00	0.50
Risk-Return Tradeoff (# of Risky Assets >= 3)	-0.26	0.69	-1.00	-0.64	-0.25	0.00	0.50

Note: These figures plot the distributions of individual degree of risk-return trade-off. The individual degree of risk-return trade-off is estimated by running a regression of expected returns on risk perception among risky assets for each respondent. "Risk-Return Tradeoff (# of Risky Asset >= 2)" denotes the risk-return trade-off measure where the minimum number of risky assets to estimate the risk-return trade-off is two.

Table IA4. **Subjective Risk-Return Trade-offs – Hong Kong survey**

	(1)	(2)
Risk perception	-0.160***	-0.186***
	(0.044)	(0.040)
Asset dummies	Yes	No
Individual dummies	Yes	Yes
N	1,613	1,613
Adjusted-R^2	0.150	0.134

Note: This table shows subjective risk-return trade-offs in a pooled regression setting. We run the following regression with Hong Kong survey:

$$Ret_i^k = \beta Risk_i^k + \gamma_i + \phi_k + \mu + \epsilon_i^k,$$

where $Ret_{i,k}$ and $Risk_{i,k}$ represent an individual i's subjective expected return and risk perception of an asset k. γ_i represents individual dummies, and ϕ_k represents asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA5. **Return Deviation and Respondents' Characteristics**

	(1)	(2)	(3)	(4)	(5)	(6)
High wealth	0.039**					0.040**
	(0.017)					(0.019)
High income		0.032*				0.023
		(0.017)				(0.020)
High edu			0.030			0.027
			(0.020)			(0.021)
High intelligence				-0.004		-0.002
				(0.017)		(0.017)
High financial literacy					-0.028*	-0.050***
					(0.017)	(0.018)
N	1,754	1,754	1,754	1,754	1,754	1,754
Adjusted-R^2	0.002	0.001	0.001	-0.001	0.001	0.005

Note: This table shows the regression of the absolute mean deviation of returns, $Avg.|Ret\_Resid|$ on dummy variables that capture respondents' characteristics. *High wealth* takes one for a respondent whose total asset value is within the top 30% (respondent specific). *High income* takes one for a respondent's income greater than or equal to $100,000. *High edu* takes one for a master's degree or a PhD degree. *High intelligence* takes one for the top 30% highest intelligence score measured using number series, picture vocabulary, and verbal analogies. *High financial literacy* takes one for the top 30% highest financial literacy score, which is between 0 and 14. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA6. **Heterogeneity of Risk-Return Trade-offs with Different Groups**

Panel A: Asset holder

Asset holder =	Asset > 0	Asset > \$5,000	Asset > \$10,000	Asset > \$30,000	Asset > \$50,000	Asset > \$200,000	Asset > \$400,000
Percent of the sample	33%	23%	20%	16%	14%	8%	4%
Risk perception	-0.325***	-0.317***	-0.313***	-0.309***	-0.307***	-0.302***	-0.299***
	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)	(0.022)
Risk perception × Asset holder	0.130***	0.162***	0.167***	0.158***	0.159***	0.171***	0.176***
	(0.012)	(0.014)	(0.014)	(0.014)	(0.014)	(0.017)	(0.021)
Adjusted-R^2	0.463	0.467	0.466	0.463	0.462	0.459	0.455

Panel B: High wealth

High wealth =	Top 50%	Top 40%	Top 30%	Top 20%	Top 10%
Percent of the sample	49%	41%	30%	21%	11%
Risk perception	-0.344***	-0.339***	-0.315***	-0.316***	-0.310***
	(0.031)	(0.028)	(0.026)	(0.025)	(0.023)
Risk perception × High wealth	0.070**	0.075**	0.037	0.061*	0.068
	(0.034)	(0.032)	(0.033)	(0.035)	(0.045)
Adjusted-R^2	0.446	0.446	0.445	0.445	0.445

Panel C: Income

High income =	Income >= \$60,000	Income >= \$75,000	Income >= \$100,000	Income >= \$150,000
Percent of the sample	54%	52%	27%	12%
Risk perception	-0.367***	-0.362***	-0.350***	-0.327***
	(0.032)	(0.028)	(0.025)	(0.023)
Risk perception × High income	0.103***	0.119***	0.149***	0.155***
	(0.034)	(0.032)	(0.033)	(0.043)
Adjusted-R^2	0.447	0.448	0.449	0.448

Note: This table shows heterogeneous subjective risk-return trade-offs in a pooled regression setting. We run the following regression:

$$Ret_i^k = \beta_1 Risk_i^k + \beta_2 Risk_i^k \times Z_i^k + \gamma_i + \phi_k + \mu + \epsilon_{i,k},$$

where $Ret_{i,k}$ and $Risk_{i,k}$ represent an individual i's subjective expected return and risk perception of an asset k. γ_i represents individual dummies. ϕ_k represent asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA6. Heterogeneity of Risk-Return Trade-offs with Different Groups (Cont'd).

Panel D: Education

High edu =	Bachelor + Master + PhD	Master + PhD	PhD
Percent of the sample	40%	18%	4%
Risk perception	-0.375***	-0.331***	-0.319***
	(0.027)	(0.023)	(0.022)
Risk perception × High edu	0.152***	0.139***	0.286***
	(0.032)	(0.041)	(0.081)
Adjusted-R^2	0.450	0.447	0.449

Panel E: Intelligence

High Intelligence =	Top 50%	Top 40%	Top 30%	Top 20%	Top 10%
Percent of the sample	51%	41%	31%	21%	11%
Risk perception	-0.367***	-0.343***	-0.335***	-0.323***	-0.311***
	(0.030)	(0.027)	(0.025)	(0.024)	(0.023)
Risk perception × High Intelligence	0.109***	0.087***	0.093***	0.085**	0.072
	(0.033)	(0.032)	(0.033)	(0.037)	(0.046)
Adjusted-R^2	0.447	0.446	0.446	0.446	0.445

Panel F: Financial literacy

High financial literacy =	Score >= 11	Score >= 12	Score >= 13	Score >= 14
Percent of the sample	50%	39%	26%	11%
Risk perception	-0.382***	-0.380***	-0.356***	-0.331***
	(0.030)	(0.028)	(0.025)	(0.023)
Risk perception × High financial literacy	0.130***	0.160***	0.165***	0.203***
	(0.033)	(0.032)	(0.033)	(0.044)
Adjusted-R^2	0.448	0.450	0.450	0.449

Table IA7. **Asset Market Participation and Subjective Return and Risk - Asset Dummies Excluded**

	(1)	(2)	(3)	(4)	(5)	(6)
	Total Effect		Extensive margin		Intensive margin	
Expected returns	0.138***		0.158***		0.124***	
	(0.007)		(0.009)		(0.013)	
Risk perception	-0.073***		-0.032***		-0.147***	
	(0.006)		(0.008)		(0.011)	
Returns/Risk ratio		0.150***		0.110***		0.183***
		(0.009)		(0.010)		(0.014)
Asset dummies	No	No	No	No	No	No
Individual dummies	Yes	Yes	Yes	Yes	Yes	Yes
N	4,160	4,160	4,160	4,160	1,774	1,774
R^2	0.207	0.144	0.388	0.330	0.286	0.211

Note: This table shows how returns and risk perceptions are associated with asset market participation decisions. We run the following regression:

$$y_i^k = \beta_1 Ret_i^k + \beta_2 Risk_i^k + \gamma_i + \mu + \epsilon_i^k, \qquad y_i^k = \beta Ret_i^k / Risk_i^k + \gamma_i + \mu + \epsilon_i^k,$$

where in Columns (1) and (2), y_i^k is the share of each risky asset in the total value of risky assets. In Columns (3) and (4), $y_i^k = \mathbb{1}\{\text{Asset Holding} > 0\}_i^k$ is an indicator that takes one for a positive holding of an asset k for an individual i. In Columns (5) and (6), y_i^k is the share of each risky asset, conditional on the positive share of each risky asset. γ_i represents individual dummies. All regressions include only individual dummies, but not asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA8. **Pairwise Asset Market Participation**

Panel A: Pairs of assets without risk-free assets

	(1)	(2)	(3)	(4)	(5)	(6)
	Real Estate - Gold	Real Estate - Stocks	Real Estate - Crypto	Gold - Stocks	Gold - Crypto	Stocks - Crypto
$Ret_i^{j,k}$	5.310***	7.233***	6.089***	10.530***	3.799***	9.556***
	(1.213)	(1.159)	(1.404)	(1.082)	(1.171)	(1.333)
$Risk_i^{j,k}$	-5.789***	-3.407**	-9.369***	-1.496	1.512	-5.405***
	(1.526)	(1.379)	(1.767)	(1.271)	(1.241)	(1.639)
Adjusted-R^2	0.036	0.033	0.071	0.084	0.013	0.084
N	1,285	1,585	876	1,217	851	865

Panel B: Pairs of assets with risk-free assets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Asset k	Real Estate		Gold		Stocks		Crypto	
Asset j	Savings	Gov Bonds	Savings	Gov Bonds	Savings	Gov Bonds	Savings	Gov Bonds
$Ret_i^{j,k}$	0.399	8.508***	-1.480	1.182	7.098***	10.274***	0.221	4.923***
	(0.848)	(1.124)	(0.988)	(1.017)	(1.053)	(1.214)	(1.175)	(1.218)
$Risk_i^{j,k}$	-5.383***	-4.720***	-8.720***	-6.314***	-5.400***	-1.491	-6.494***	-3.349***
	(1.013)	(1.137)	(1.180)	(0.974)	(1.185)	(1.221)	(1.306)	(1.122)
Adjusted-R^2	0.016	0.051	0.041	0.037	0.032	0.053	0.027	0.026
N	1,798	1,357	1,298	1,178	1,671	1,333	893	851

Note: This table shows how relative risk/return differences are associated with relative asset market participation. We run the following regression as follows:

$$Participation_i^{j,k} = \beta_1^{j,k} Ret_i^{j,k} + \beta_2^{j,k} Risk_i^{j,k} + \mu + \epsilon_i,$$

where $Participation_i^{j,k}$ is a relative participation measure, defined as $Participation_i^{j,k} = \mathbb{1}\{\text{Asset Holding} > 0\}_i^j - \mathbb{1}\{\text{Asset Holding} > 0\}_i^k$ where $\mathbb{1}\{\text{Asset Holding} > 0\}_i^j$ is an indicator that takes one for a positive holding of an asset for an individual i. $Risk_i^{j,k} = Risk_i^j - Risk_i^k$ and $Ret_i^{j,k} = Ret_i^j - Ret_i^k$ capture relative risk and return differences. Panel A reports six asset pairs among the four risky assets. Panel B reports eight risky-risk-free asset pairs. Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA9. **Risk Components and Pairwise Asset Market Participation**

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Price Stability					
	Gold - Real Estate	Stocks - Real Estate	Stocks - Gold	Crypto - Real Estate	Crypto - Gold	Crypto - Stocks
$Risk^{Stability}$_Diff	-11.142***	-11.070***	0.776	-12.880***	-0.237	-8.213***
	(1.770)	(2.154)	(2.141)	(2.316)	(1.835)	(2.151)
N	1,877	2,107	1,860	1,342	1,323	1,339
	Panel B: Inflation					
	Gold - Real Estate	Stocks - Real Estate	Stocks - Gold	Crypto - Real Estate	Crypto - Gold	Crypto - Stocks
$Risk^{Inflation}$_Diff	-12.502***	-8.961***	-10.123***	-19.347***	-2.685	-14.805***
	(1.918)	(2.176)	(1.896)	(2.540)	(1.875)	(2.266)
N	1,713	1,887	1,694	1,223	1,214	1,218
	Panel C: Liquidity					
	Gold - Real Estate	Stocks - Real Estate	Stocks - Gold	Crypto - Real Estate	Crypto - Gold	Crypto - Stocks
$Risk^{Liquidity}$_Diff	-2.803	-10.708***	-9.745***	-10.002***	-8.296***	-11.983***
	(1.984)	(1.804)	(1.774)	(2.127)	(1.819)	(2.052)
N	1,925	2,056	1,879	1,234	1,225	1,227
	Panel D: Cash Payment					
	Gold - Real Estate	Stocks - Real Estate	Stocks - Gold	Crypto - Real Estate	Crypto - Gold	Crypto - Stocks
$Risk^{Cash}$_Diff	0.39	1.614	-16.467***	-2.211	-6.703***	-15.325***
	(2.144)	(2.077)	(2.037)	(2.640)	(2.055)	(2.456)
N	1,760	1,927	1,719	1,192	1,189	1,188
	Panel E: Tangibility					
	Gold - Real Estate	Stocks - Real Estate	Stocks - Gold	Crypto - Real Estate	Crypto - Gold	Crypto - Stocks
$Risk^{Tangibility}$_Diff	-10.743***	-1.155	3.645	-13.682***	-0.77	-4.803**
	(2.038)	(2.227)	(2.297)	(2.716)	(2.081)	(2.322)
N	1,976	2,067	1,935	1,522	1,511	1,509

Note: This table shows how different types of risk attributes affect relative asset market participation. The relative participation and risk difference is defined the same in Table IA8. The superscript *type* refers to the specific type of risk. We order assets in a way that for each asset pair, a risky asset j earns a higher objective return and exposes higher objective risk than risky asset k in a specific risk type:

$$Participation_i^{j,k} = \beta Risk^{type}\_\text{Diff} + \mu + \epsilon_i,$$

Robust standard errors are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Table IA10. **Financial Literacy and Asset Participation Decisions**

	(1)	(2)	(3)
	Total Effect	Extensive margin	Intensive margin
I don't know:	-0.193***	-0.383***	-0.029
Expected returns	(0.014)	(0.017)	(0.051)
I don't know:	-0.046***	-0.129***	0.049
Risk perception	(0.012)	(0.017)	(0.081)
Asset dummies	Yes	Yes	Yes
Individual dummies	Yes	Yes	Yes
N	6,856	6,856	1,977
Adjusted-R^2	0.424	0.453	0.336

Note: This table shows how financial literacy is related to asset participation decisions. We run the following regression:

$$y_i^k = \beta_1 \mathbb{1}(Ret_i^k = idk) + \beta_2 \mathbb{1}(Risk_i^k = idk) + \gamma_i + \phi_k + \mu + \epsilon_i^k,$$

where $\mathbb{1}(Ret_i^k = idk)$ ($\mathbb{1}(Risk_i^k = idk)$) is an indicator taking one for an individual i choosing “I don't know" about expected returns (risk) of an asset k. In Columns (1), y_i^k is the share of each risky asset in the total value of risky assets. In Columns (2), $y_i^k = \mathbb{1}\{\text{Asset Holding} > 0\}_i^k$ is an indicator that takes one for a positive holding of an asset k for an individual i. In Columns (3), y_i^k is the share of each risky asset, conditional on the positive share of each risky asset. γ_i represents individual dummies. ϕ_k represent asset dummies. All regressions include both individual and asset dummies. Standard errors clustered at the respondent level are reported in parenthesis. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

I Questionnaire UAS 444

Main intro (Section Assets)
This survey asks about your opinions on the safety of various investment assets. "**Investment assets" refer to savings, stocks, real estate, gold, cryptocurrency, and government bonds. "Investment assets" do not include your investment in 401(k) or other retirement accounts.**

Even if you don't own any of these assets, your opinions are still very valuable to us. We would greatly appreciate it if you could give us your best estimates.

1. Questions about approximate total asset value

For each type of financial asset that you have, what is the approximate total value? Please do not include the value of any assets held in retirement accounts such as IRAs or 401(k)s.

A list of assets:
Savings (Savings/Money in the saving accounts.)

Stocks (Stocks/Individual stocks (e.g., Apple, Tesla, JPMorgan Chase), stock index funds (S&P500), passive ETF, active equity mutual fund. Stock investment in 401(k) plan is excluded.)

Real estate (Real estate property/Housing, condos, other real estate properties, and REITs (or any funds that solely invest in real estate).)

Gold (Gold/Gold bullion, paper gold, and any funds that solely invest in gold.)

Cryptocurrency (Cryptocurrency/Bitcoin, Ethereum, Dogecoin, other blockchain-based cryptocurrencies, and any funds that solely invest in cryptocurrencies.)

Government bonds (U.S. government bonds/The bonds issued by the U.S. government, and any funds that solely invest in U.S. government bonds.)

1 = I do not have this asset
2 = $5,000 or less
3 = $5,001 to $10,000
4 = $10,001 to $30,000
5 = $30,001 to $50,000
6 = $50,001 to $200,000
7 = $200,001 to $400,000
8 = $400,001 or more

This question asks about the types of stocks you own, and the percentage of each kind in your portfolio.:

Individual stocks: The shares in a specific company e.g., Apple.
Mutual funds: The fund is managed by a fund manager, and the manager makes investment decisions for you.
Exchange-Traded Funds (ETFs): An investment that tracks an index (e.g., S&P500) or a sector

(e.g., Oil & Gas) which can be purchased or sold on a stock exchange the same way a regular stock.

For each type of stock, indicate whether you own any stock of that type, and if so, what is the percentage among all the stocks you own. If you aren't sure, your best guess will do. In this question, please exclude any of your stock investments through 401(K) or other retirement accounts.

Individual share in a company
(percentage Individual share in a company in section Assets)

Mutual funds
(percentage Mutual funds in section Assets)

Exchange-Traded Funds (ETFs)
(percentage Exchange-Traded Funds (ETFs) in section Assets)

Question about how confident with stock type answers in section Assets
On a scale of 1 to 5, with 1 being "not at all confident" and 5 being "extremely confident", how confident are you with your answers to the above question?

1 = 1 Not at all confident
2 = 2
3 = 3
4 = 4
5 = 5 Extremely confident

2. Question about expected returns

The expected return for an asset is the profit or loss anticipated by an investor as a percentage of the initial investment.

Please provide your best estimate of the level of expected returns for each asset over the next 10 years, on a scale of 1 to 5, with 1 being a minimal return and 5 being a very high return.

A list of assets:
Savings (Savings/Money in the saving accounts.)

Stocks (Stocks/Individual stocks (e.g., Apple, Tesla, JPMorgan Chase), stock index funds (S&P500), passive ETF, active equity mutual fund. Stock investment in 401(k) plan is excluded.)

Real estate (Real estate property/Housing, condos, other real estate properties, and REITs (or any funds that solely invest in real estate).)

Gold (Gold/Gold bullion, paper gold, and any funds that solely invest in gold.)

Cryptocurrency (Cryptocurrency/Bitcoin, Ethereum, Dogecoin, other blockchain-based cryptocurrencies, and any funds that solely invest in cryptocurrencies.)

Government bonds (U.S. government bonds/The bonds issued by the U.S. government, and any funds that solely invest in U.S. government bonds.)

1 = 1 Minimal return
2 = 2
3 = 3
4 = 4
5 = 5 Very high return
6 = I don't know

3. Question about safety (risk) for each asset

How would you rate the investment safety (risk) for each asset?

A list of assets:
Savings (Savings/Money in the saving accounts.)

Stocks (Stocks/Individual stocks (e.g., Apple, Tesla, JPMorgan Chase), stock index funds (S&P500), passive ETF, active equity mutual fund. Stock investment in 401(k) plan is excluded.)

Real estate (Real estate property/Housing, condos, other real estate properties, and REITs (or any funds that solely invest in real estate).)

Gold (Gold/Gold bullion, paper gold, and any funds that solely invest in gold.)

Cryptocurrency (Cryptocurrency/Bitcoin, Ethereum, Dogecoin, other blockchain-based cryptocurrencies, and any funds that solely invest in cryptocurrencies.)

Government bonds (U.S. government bonds/The bonds issued by the U.S. government, and any funds that solely invest in U.S. government bonds.)

1 = Very safe
2 = Safe
3 = Average
4 = Risky
5 = Very risky
6 = I don't know

4. Questions about the importance of asset attributes

We hope to understand how you would evaluate an investment asset's safety. To maximize the investment safety, how important are the following attributes? On a scale of 1 to 5 with 1 being not important at all and 5 being extremely important, please rate each attribute.

A list of attributes:
Price stability (price of safe asset should remain stable in section Assets) When an economic crisis happens (e.g., the 2008 financial crisis), the price of a safe asset should remain stable or, at the very

least, the price drop should be limited.

Inflation (A safe investment asset should protect my wealth from inflation in section Assets) A safe investment asset should protect my wealth from inflation.

Liquidity (A safe investment asset should be easily bought or sold in the market and converted into cash in section Assets) A safe investment asset should be easily bought or sold in the market and converted into cash.

Cash flow (A safe investment asset should pay cash periodically (e.g., monthly/quarterly/annual dividends and interests) in section Assets) A safe investment asset should pay cash periodically (e.g., monthly/quarterly/annual dividends and interests).

Tangibility (A safe investment asset should be physically touchable (can be stored at home, not purely digital) in section Assets) A safe investment asset should be physically touchable (can be stored at home, not purely digital).

1 = 1 Not important at all
2 = 2
3 = 3
4 = 4
5 = 5 Extremely important
6 = I don't know

5. Question about each asset attribute for each asset

How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

A list of attributes:
When an economic crisis happens, the price of the investment asset remains stable.

The investment asset protects wealth from inflation.

The investment asset can be easily converted into cash.

The investment asset pays cash periodically.

The investment asset is physically touchable.

A list of assets:
Savings (Savings/Money in the saving accounts.)

Stocks (Stocks/Individual stocks (e.g., Apple, Tesla, JPMorgan Chase), stock index funds (S&P500), passive ETF, active equity mutual fund. Stock investment in 401(k) plan is excluded.)

Real estate (Real estate property/Housing, condos, other real estate properties, and REITs (or any funds that solely invest in real estate).)

Gold (Gold/Gold bullion, paper gold, and any funds that solely invest in gold.)

Cryptocurrency (Cryptocurrency/Bitcoin, Ethereum, Dogecoin, other blockchain-based cryptocurrencies, and any funds that solely invest in cryptocurrencies.)

Government bonds (U.S. government bonds/The bonds issued by the U.S. government, and any funds that solely invest in U.S. government bonds.)

1 = Strongly disagree
2 = Somewhat disagree
3 = Neither disagree nor agree
4 = Somewhat agree
5 = Strongly agree
6 = I don't know

6. Question about risk aversion

How willing are you to take investment risks? On a scale of 1 to 5 with 1 "I would avoid financial risks as much as possible", and 5: "I am excited to take financial risks".
Note: Financial risk refers to the possibility of losing some or all of an original investment.

1 = 1 Not at all willing to take financial risks
2 = 2
3 = 3
4 = 4
5 = 5 Very willing to take financial risks

6. Questions about trust

How much do you trust the integrity and abilities of the following entities? On a scale of 1 to 5 with 1 being No trust at all and 5 being complete trust.

A list of entities:
The integrity of the federal government

The integrity of U.S. companies

The integrity of fund managers

The ability of the federal government to manage the financial risk of the United States

Private companies' capability of creating value for their investors

Ability of mutual fund managers to invest well and create value for their investors

1 = 1 Not trusting at all
2 = 2
3 = 3
4 = 4
5 = 5 Completely trusting

UnderStandingAmericaStudy

This survey asks about your opinions on the safety of various investment assets. "Investment assets" refer to savings, stocks, real estate, gold, cryptocurrency, and government bonds. **"Investment assets" do not include your investment in 401(k) or other retirement accounts.**

Even if you don't own any of these assets, your opinions are still very valuable to us. We would greatly appreciate it if you could give us your best estimates.

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For each type of financial asset that you have, what is the approximate total value? Please do not include the value of any assets held in retirement accounts such as IRAs or 401(k)s.

	I do not have this asset	$5,000 or less	$5,001 to $10,000	$10,001 to $30,000	$30,001 to $50,000	$50,001 to $200,000	$200,001 to $400,000	$400,001 or more
Savings	○	○	○	○	○	○	○	○
Stocks	○	○	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○	○	○
Gold	○	○	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○	○	○

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This question asks about the types of stocks you own, and the percentage of each kind in your portfolio.:

Individual stocks: The shares in a specific company e.g., Apple.
Mutual funds: The fund is managed by a fund manager, and the manager makes investment decisions for you.
Exchange-Traded Funds (ETFs): An investment that tracks an index (e.g., S&P500) or a sector (e.g., Oil & Gas) which can be purchased or sold on a stock exchange the same way a regular stock.

For each type of stock, indicate whether you own any stock of that type, and if so, what is the percentage among all the stocks you own. If you aren't sure, your best guess will do. In this question, please exclude any of your stock investments through 401(K) or other retirement accounts.

Stock type	Do not own	% of your stock portfolio
Individual share in a company	○	%
Mutual funds	○	%
Exchange-Traded Funds (ETFs)	○	%
Total stock portfolio		%

On a scale of 1 to 5, with 1 being "not at all confident" and 5 being "extremely confident", how confident are you with your answers to the above question?

○ 1 Not at all confident
○ 2
○ 3
○ 4
○ 5 Extremely confident

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The expected return for an asset is the profit or loss anticipated by an investor as a percentage of the initial investment.

Please provide your best estimate of the level of expected returns for each asset over the next 10 years, on a scale of 1 to 5, with 1 being a minimal return and 5 being a very high return.

	1 Minimal return	2	3	4	5 Very high return	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How would you rate the investment safety (risk) for each asset?

	Very safe	Safe	Average	Risky	Very risky	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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We hope to understand how you would evaluate an investment asset's safety. To maximize the investment safety, how important are the following attributes? On a scale of 1 to 5 with 1 being not important at all and 5 being extremely important, please rate each attribute.

	1 Not important at all	2	3	4	5 Extremely important	I don't know
When an economic crisis happens (e.g., the 2008 financial crisis), the price of a safe asset should remain stable or, at the very least, the price drop should be limited	○	○	○	○	○	○
A safe investment asset should protect my wealth from inflation	○	○	○	○	○	○
A safe investment asset should be easily bought or sold in the market and converted into cash	○	○	○	○	○	○
A safe investment asset should pay cash periodically (e.g., monthly/quarterly/annual dividends and interests)	○	○	○	○	○	○
A safe investment asset should be physically touchable (can be stored at home, not purely digital)	○	○	○	○	○	○

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How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

When an economic crisis happens, the price of the investment asset remains stable.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

The investment asset protects wealth from inflation.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

The investment asset can be easily converted into cash.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

The investment asset pays cash periodically.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How much do you agree with the following sentences for each asset in general? Please answer on a scale of 1 to 5, with 1 being strongly disagree and 5 being strongly agree.

The investment asset is physically touchable.

	Strongly disagree	Somewhat disagree	Neither disagree nor agree	Somewhat agree	Strongly agree	I don't know
Savings	○	○	○	○	○	○
Stocks	○	○	○	○	○	○
Real estate property	○	○	○	○	○	○
Gold	○	○	○	○	○	○
Cryptocurrency	○	○	○	○	○	○
U.S. government bonds	○	○	○	○	○	○

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How willing are you to take investment risks? On a scale of 1 to 5 with 1 "I would avoid financial risks as much as possible", and 5: "I am excited to take financial risks".

Note: Financial risk refers to the possibility of losing some or all of an original investment.

○ 1 Not at all willing to take financial risks
○ 2
○ 3
○ 4
○ 5 Very willing to take financial risks

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How much do you trust the integrity and abilities of the following entities? On a scale of 1 to 5 with 1 being No trust at all and 5 being complete trust.

	1 Not trusting at all	2	3	4	5 Completely trusting
The integrity of the federal government	○	○	○	○	○
The integrity of U.S. companies	○	○	○	○	○
The integrity of fund managers	○	○	○	○	○
The ability of the federal government to manage the financial risk of the United States	○	○	○	○	○
Private companies' capability of creating value for their investors	○	○	○	○	○
Ability of mutual fund managers to invest well and create value for their investors	○	○	○	○	○

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Could you tell us how interesting or uninteresting you found the questions in this interview?

○ Very interesting
○ Interesting
○ Neither interesting nor uninteresting
○ Uninteresting
○ Very uninteresting

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Do you have any other comments on the interview? Please type these in the box below. (If you have no comments, please click next to complete this survey.)

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