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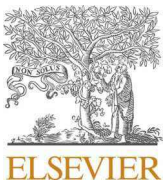

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Beauty and stock market participation

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ABSTRACT

This paper investigates whether beauty, an important natural endowment, affects investment decisions. Using data from the Wisconsin Longitudinal Survey (WLS), which provides a photo-based measure of facial beauty, we find that better-looking individuals are more likely to own stocks and invest a larger share of wealth in stocks. We consider a wide range of potential mediators that may drive this relationship between beauty and stock market participation. We find that income and sociability explain a large portion of the beauty effect. For both males and females, beauty has a significant positive impact on stock market participation. Using another dataset that includes the interviewer's rating of the respondent's physical attractiveness, we find similar results. Our study contributes to a better understanding of the economic returns to beauty and the source of heterogeneity in household portfolio choice.

1. Introduction

Beauty is one of the most discussed and evaluated natural endowments of a person. While there is no universal standard for beauty, evidence suggests substantial agreement among people about beauty (Hamermesh, 2011). Beauty has been associated with a wide range of individual outcomes (Hamermesh, 2011). In particular, the labor market premium to beauty has received substantial scholarly attention (Hamermesh and Biddle, 1994). Attractive individuals have been found to enjoy more favorable treatment in hiring and promotion processes (Morrow et al., 1990; Mulford et al., 1998; Ruffle and Shtudiner, 2015) and to earn higher income from their jobs (Scholz and Sicinski, 2015).

However, the literature on the economic return to beauty overlooks the potential relation between beauty and an important economic outcome, namely, portfolio choice. We fill this gap by investigating the effect of beauty on people's stock investment behavior. Stock market nonparticipation is prevalent among households worldwide and has important economic consequences at the individual and aggregate levels (Campbell, 2006; Gomes et al., 2021). Given the wide range of economic, social, and psychological outcomes associated with beauty, an exploration of whether and how beauty also affects stock market participation is intriguing.

Scientific evidence suggests that beauty is influenced by deep biological factors that go beyond mere cultural standards (Langlois et al., 2000; Slater et al., 2000). In this paper, we focus on the impact of the innate aspect of beauty, which is predetermined by nature. Following popular practices in recent economics and finance literature (Scholz and Sicinski, 2015; Graham et al., 2017), in the main analysis, we use subjects' facial attractiveness in photos as the measure of beauty. From an evolutionary biology perspective, certain facial traits, such as symmetry and averageness, advertise an individual's biological quality and influence how physically appealing an individual is (Langlois et al., 2000; Rhodes, 2006). Photo-based measures of facial attractiveness better capture the innate aspect of beauty because they mitigate concerns about the influence of other factors, such as tone of voice, body language, clothing, and environment. Specifically, we use data from the

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Wisconsin Longitudinal Survey (WLS), which is a long-term study of a cohort of students who graduated from Wisconsin high schools in 1957. Beauty in the WLS is measured based on assessments of black-and-white yearbook photographs from the participants' senior year of high school. Using information on survey participants' portfolio choice and controlling for pre-determined factors such as gender and parental characteristics, we find that facial beauty has significant positive impacts on both the intensive and extensive margins of stock market participation. The effect of beauty is also economically sizable: a one-standard deviation increase in the facial beauty score increases the probability of participating in the stock market by 2.29 percentage points, which amounts to 4.02% of the sample mean.

We proceed with an exploration of the potential mechanisms underlying this beauty effect. We consider a wide range of covariates that have been shown to affect stock market participation and that may be influenced by beauty. First, beauty may increase cognitive ability as positive teacher and peer interactions during schooling can increase academic achievement and motivation (Perry and Weinstein, 1998; Robbins et al., 2004). Second, better-looking people tend to do better in the marriage market (Beller et al., 1994; Hamermesh and Abrevaya, 2013). Third, beauty might signal better health (Rhodes et al., 2001). Fourth, beauty matters in the labor market and might influence both the level and variability of an individual's income (Mobius and Rosenblat, 2006). Fifth, beauty could have an influence on a variety of psychological traits such as depression (Datta Gupta et al., 2016), happiness (Hamermesh and Abrevaya, 2013), self-confidence (Mobius and Rosenblat, 2006), and risk preference. Sixth, beauty could foster positive interactions with others (Jackson et al., 1995; Langlois et al., 2000).

Following the literature, we perform a mediation analysis to quantify the relative contributions of these different channels. Specifically, we group the explanatory variables into categories corresponding to each of the various potential channels based on insights from the literature discussed above. We then examine the effect of beauty on each of the potential mediators and finally examine the degree to which each group of mediators reduces the association between beauty and stock market participation.

Consistent with prior studies, we find that beauty is positively related to educational attainment, intelligence, marital status, health status, income levels and stability, psychosocial well-being, self-confidence, risk preference, and social interactions. By adding mediators to the regression of stock market participation on beauty, we find that cognitive ability explains 1.75% of the beauty effect, marital status explains 9.61% of the effect, health status explains 10.48% of the effect, income variables explain 19.65% of the effect, psychological traits explain 7.42% of the effect, and measures of sociability explain 17.47% of the effect. In sum, the income and sociality channels appear to be more important in explaining the beauty effect than other channels. In addition, approximately half of the effect remains unexplained even after including these mediators.

We perform a number of additional analyses to extend our research and check the robustness of our main findings. First, we examine whether the effects of beauty differ by gender. The literature finds mixed results regarding the heterogeneous effects of beauty across genders (French, 2002; Hamermesh, 2011). The heterogeneity analysis shows that beauty has similar effects on stock market participation for men and women in our sample.

Second, we explore the potential non-monotonic effects of beauty by stratifying the level of beauty into quintiles. We find that compared with average-looking people, people in the top beauty quintile are significantly more likely to participate in the stock market, while those in the bottom quintile are significantly less likely to participate in the stock market. This result indicates that there exists both a beauty premium and a plainness penalty with respect to financial risk-taking.

Third, we control for height and obesity, two physical attributes that have recently been shown to affect stock market participation, to better isolate the effects of beauty. The positive impact of beauty on stock market participation remains robust to this exercise.

Finally, we examine whether our findings hold in an alternative sample. Specifically, we use data drawn from the National Longitudinal Study of Adolescent to Adult Health (Add Health), a longitudinal study of a nationally representative sample of adolescents in grades 7–12 in the United States that was conducted during the 1994-95 school year. We use the third wave of Add Health, completed when participants were in their 20s, because only this wave contains information on stock investments. The Add Health data measure survey participants' physical attractiveness through interviewer ratings. While the photo-based measure of facial attractiveness used in the main analysis is better at capturing the innate nature of beauty, physical attractiveness rated by interviewers is often used as a measure of beauty in the economics literature (Mocan and Tekin, 2010; Hamermesh and Abrevaya, 2013). To capture the innate aspect of beauty in the Add Health data to the best extent, we include a wide range of controls. For example, we control for parental characteristics to isolate the effects of family background. In addition, because beauty might be in the eye of the beholder, we include interviewer fixed effects. Finally, we include school fixed effects. Our regression analysis shows that beauty still has a significant and positive impact on the probability of participating in the stock market in this alternative sample.

Our study makes several contributions. First, our work contributes to the literature on the impact of natural endowments on household financial outcomes. The literature has argued that a substantial portion of heterogeneity in household financial outcomes is explained by attributes assigned by nature (Cesarini et al., 2010; Cronqvist and Siegel, 2014; Barth et al., 2020). In particular, the impact of intelligence on household financial decisions has attracted increasing scholarly attention (Grinblatt et al., 2011, 2016). Beauty is another trait that is largely endowed by nature and has a far-reaching impact on human life. While standard portfolio theory implies that every rational investor should hold stocks, the level of stock market participation varies significantly across the population, even after controlling for a wide range of demographic and economic factors (Barnea et al., 2010). By demonstrating the significant effect of beauty, our study contributes to a better understanding of the source of heterogeneity in household portfolio choice.

Our study is also related to the economic returns to physical attributes in general and to beauty in particular (Mobius and Rosenblat, 2006). While existing studies have focused on the labor market beauty premium, our results show that beauty is related to greater stock market participation. Participation in the stock market is important for wealth accumulation (Campbell, 2006). Therefore, our results provide a new perspective on the economic benefits associated with beauty.

The positive impact of beauty on stock market participation also sheds light on the source of social inequality and stratification (Wong and Penner, 2016; Monk Jr et al., 2021). The sociology literature has recently considered beauty, like race and gender, to be an important embodied status marker that constitutes a key aspect of social stratification (Frevert and Walker, 2014; Wong and Penner, 2016; Monk Jr et al., 2021). Given that stock market participation affects the trajectory of wealth over the life cycle (Guiso and Sodini, 2013), our study contributes to understanding the stratification effects of beauty from the perspective of portfolio choice.

Furthermore, our study is policy relevant. Stock market participation is important for wealth accumulation (Campbell, 2006). While the literature has already shown that factors such as income and social interactions influence household stock market participation, our findings suggest that part of the variation in these variables is attributed to beauty, a factor that is largely endorsed by nature. Therefore, public policies that encourage or even force individuals to participate in the stock market (e.g., offering stock market investment as the default choice in pension schemes) could be justified because they reduce the innate inequality in access to equity returns. A better understanding of why better-looking people have higher levels of stock market participation also provides a starting point to design public policies that create

an environment where everyone, regardless of natural endowments such as beauty, has the opportunity and ability to access the financial market.

The remainder of the paper is organized as follows. Section 2 describes the data used in the analysis, the main variables of interest, and the empirical strategy. Section 3 discusses the empirical results. Section 4 concludes the paper.

2. Data, variables, and empirical strategy

2.1. Data and the beauty measure

Our main data source is the Wisconsin Longitudinal Survey (WLS). The WLS is a long-term study of a cohort of students who graduated from public, private, and parochial schools in Wisconsin. Interviews with either the respondents or their parents were conducted six times over a period of more than 50 years (in 1957, 1964, 1975, 1992, 2004 and 2011). The survey data contain detailed information on finances and a wide range of demographic characteristics. They are supplemented with school and public records. We restrict our analysis to the data collected in 2004 because that is the only wave that contains information on portfolio composition. The age of this cohort in 2004 was approximately 64 years old.

One of the key advantages of the WLS data lies in the provision of a facial beauty measure, which allows us to study the influence of beauty on household stock market participation. The WLS beauty measure was constructed from ratings of senior-year high school yearbook photographs (taken at approximately age 18). The yearbooks used were collected for a random subsample of the WLS respondents.

The yearbook photographs were rated for attractiveness by judges recruited from the Madison Senior Scholars Program. Each respondent was rated twelve times, once each by six male and six female judges whose ages ranged from 61 to 89. The facial attractiveness ratings were provided on an 11-point scale with endpoints labeled "not at all attractive" (1) and "extremely attractive" (11). Separate scales were developed for men and women, each anchored with five photographs representing scores of 2, 4, 6, 8, and 10 on the eleven-point scale. During coding, the raters saw the WLS photographs one at a time displayed on a computer screen beneath the scale augmented with the anchoring photographs. In terms of reliability, the facial attractiveness ratings have a Cronbach's alpha of 0.87.

Following the literature (Hamermesh and Abrevaya, 2013; Scholz and Sicinski, 2015; Patel and Wolfe, 2021), we standardized the raw beauty ratings by subtracting the specific judge's mean rating and dividing by his or her standard deviation across all photographs. Then, we normalized them to have a mean of zero and a standard deviation of one. Because the WLS beauty measure is based on the ratings of facial beauty, we refer to it as Facial Beauty in the following empirical analysis. Fig. 1 depicts the distribution of Facial Beauty in the WLS sample.

The WLS beauty measure has several advantages over other measures used in the literature (e.g., Hamermesh and Biddle 1994, Mocan and Tekin 2010). First, using black-and-white photo-based measures mitigates concerns that the respondent's education, socioeconomic status, body language and physical surroundings can bias the evaluation of his or her physical attractiveness based on a face-to-face interview. If these biases occur, a spurious correlation could arise between beauty and stock market participation. Second, the judges' assessment of attractiveness could be influenced by the sequence in which photos were rated. Anchoring the beauty measure in the WLS addresses this issue by giving common reference points from the outset and showing every judge specific examples of photos rated 2, 4, 6, 8, and 10. Third, the use of multiple raters to evaluate attractiveness can reduce the idiosyncratic variance of attractiveness measures based on a single score and increase the precision of the estimation of the beauty effect.

2.2. Stock market participation and control variables

Following the literature (e.g., Malmendier and Nagel 2011, Giannetti and Wang 2016), we employ two measures of stock market participation as dependent variables. The first measure, Stock ownership, is a dummy variable that equals one if the respondent owns stocks and zero otherwise. The second measure, Stock share, is the percentage of total household wealth accounted for by direct and indirect stockholdings. These two measures represent the level of stock market participation on the extensive margin and intensive margin, respectively.

To account for potential confounders that affect the relationship between beauty and stock market participation, we control for an array of individual characteristics, including age, gender, and number of siblings.[2] Following the literature (Scholz and Sicinski, 2015; Addoum et al., 2017), we include several parental characteristics, including parental education and income. Since intergenerational transfer of wealth can impact recipients' portfolio choice (Andersen and Nielsen, 2011), we also control for inheritance. Tables A1 and 1 report the definitions and summary statistics of all the variables outlined above.

It is important to note that our choice of control variables differs from prior papers on stock market participation (e.g., Giannetti and Wang 2016, Ke 2021, Gan et al. 2022). For example, we do not control for education and income in the benchmark analysis because they are themselves potentially affected by beauty (Hamermesh and Biddle, 1994; Scholz and Sicinski, 2015). As such, these variables could be described as "bad controls", to use the terminology of Angrist and Pischke (2009). Bad controls are variables that are themselves outcome variables and at the same time could affect the key outcome variable of interest. Hence, we do not include these variables in the benchmark analysis to avoid the problems that arise from potentially endogenous control variables (Angrist and Pischke, 2009). Instead, we follow the literature (Case and Paxson, 2008; Addoum et al., 2017) and treat them as potential mediators underlying the relationship between beauty and stock market participation in the following mediation analysis. In contrast, the covariates included in our analysis, such as age and gender, are variables that can be thought of as having been fixed at the time the regressor of interest was determined and therefore are unlikely to be affected by the regressor, the respondent's level of facial beauty.

Before examining the regression estimates, we first graphically show the relationship between beauty and stock market participation in Fig. 2, which plots the mean stock ownership and stock share for each quintile of facial beauty. In general, attractive individuals are more likely to invest in stocks than their counterparts; mean stock ownership is 61.28% for individuals in the highest rating quintile but is 51.43% for those in the lowest rating quintile. We observe a similar pattern for the mean share of financial wealth invested in stocks. To more accurately assess the impact of beauty on financial risk-taking, we proceed with a regression framework, which is specified below.

2.2. Empirical strategy

We estimate the relationship between beauty and stock market participation using the following regression model:

$$Y_i = \beta_0 + \beta_1 Beauty_i + \beta_2 X_i + \varepsilon_{isr} \quad (1)$$

where Y_i is either Stock ownership or Stock share for individual i and

[2] Prior studies have documented noticeable variations in stock market participation across racial identities (e.g., Chiteji and Stafford 1999, Bonaparte et al. 2023). However, we are unable to control for race, because the WLS does not provide the information on racial identity for privacy protection. As a robustness check, we include race as a control variable when using data from Add Health in Section 3.3.4. We find the effect of beauty on stock market participation remains robust to the inclusion of race.

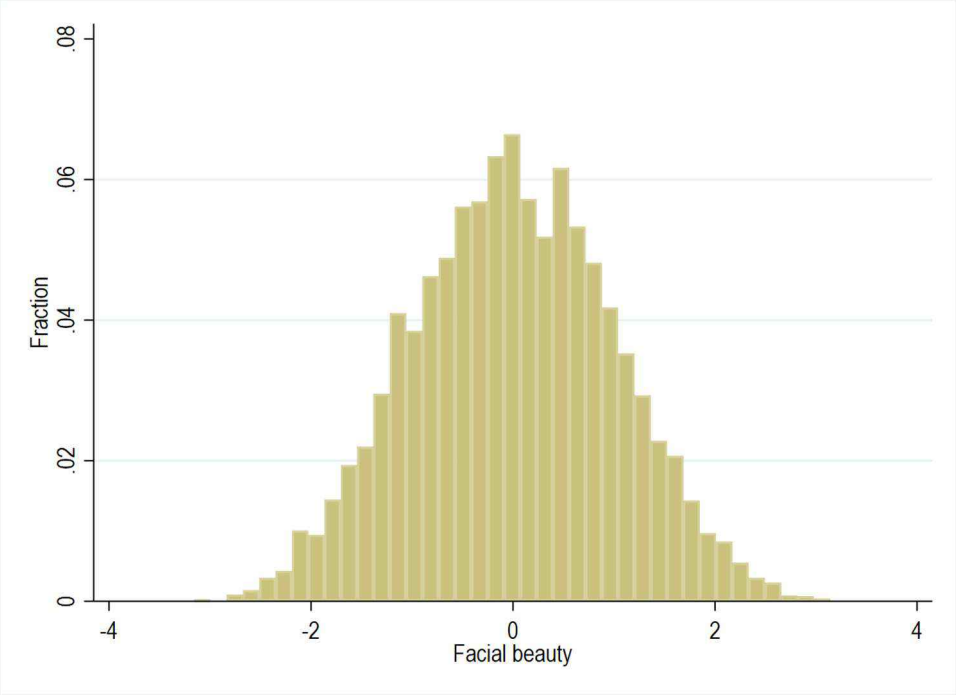

Fig. 1. Distribution of facial beauty ratings in the WLS sample.

Table 1
Summary statistics.

	Mean	Median	S.D.	Obs.
Stock ownership	0.569	1	0.495	4702
Stock share	0.272	0.091	0.322	4702
Facial beauty	0	-0.004	1	4702
Age	64.310	64	0.673	4702
Female	0.453	0	0.498	4702
Number of siblings	3.195	3	2.509	4702
Father's education	9.653	8	3.271	4702
Mother's education	10.497	12	2.744	4702
Ln(Parental income)	3.766	3.989	1.040	4702
Ln(Inheritance)	1.141	0	3.388	4702
College	0.288	0	0.453	4702
Test score	0	-0.046	1	4702
Married	0.793	1	0.405	4702
Heath	4.530	5	0.710	4702
Ln(Income)	10.017	10.776	2.916	4702
Income risk	1.021	0.548	1.423	4702
Ln(Wealth)	12.570	12.370	1.292	4702
Depression	0	-0.310	1	4702
Happiness	4.786	5	0.550	4702
Self-confidence	0	0.100	1	4702
Risk aversion	3.723	4	0.983	4702
Charity organization	0.386	0	0.487	4702
Training organization	0.182	0	0.386	4702
Sports team	0.112	0	0.315	4702
Church	0.494	0	0.500	4702
Political organization	0.101	0	0.302	4702

This table reports the summary statistics for the main variables in the WLS sample. All variables are defined in Table A1.

$Beauty_i$ is his or her beauty rating. X_i is a vector of control variables as outlined above. ε_{ist} is the error term. Our primary interest lies in the estimate of β_1, which captures the effect of beauty on an individual's propensity to take financial risks. Because Stock ownership is a binary variable and Stock share is censored from below at zero, we use probit models for estimation when the dependent variable is Stock ownership and Tobit models when the dependent variable is Stock share.

3. Empirical results

3.1. Benchmark results

Table 2 presents the results of the benchmark regressions. Columns (1) to (3) report the marginal effects from probit participation regressions, while columns (4) to (6) report the marginal effects from Tobit asset allocation regressions. Holding all controls constant at their mean values, we calculate the marginal effects and report them in the table instead of the estimated coefficients.

When we include no controls in column (1), we find that the estimated marginal effect of beauty on stock ownership is positive and highly significant at the 1% level. As we add individual and parental characteristics sequentially to the model in columns (2)-(3), the marginal effect decreases but remains significantly positive. These findings reveal that attractive individuals are more likely to participate in the stock market.

The economic significance of this estimate is not negligible. In column (3), when all control variables are included, we observe that the marginal effect of beauty is 0.0229, which implies that a one-standard deviation increase in the facial beauty score increases the probability of participating in the stock market by 2.29 percentage points. Since average stock ownership in the sample is 56.9%, this increase represents 4.02% (2.29/56.9) of the sample mean. Using gender as a comparison, being female is associated with a 2.14 percentage point decrease in the probability of holding stocks. Hence, the impact of beauty on stock ownership is greater than the impact of gender. This evidence implies that the beauty effect is economically sizable because gender has been shown to be a crucial determinant of stock market participation (Halko et al., 2012; Ke, 2021).

To further understand how household portfolio choice varies with beauty, we examine asset allocation decisions using Tobit regressions. We use the percentage of financial wealth invested in stocks as the dependent variable. The results are reported in columns (4) to (6). We observe that the estimated marginal effect of facial beauty is significantly positive in all specifications. In economic terms, the results in column (6) indicate that a one-standard deviation increase in facial

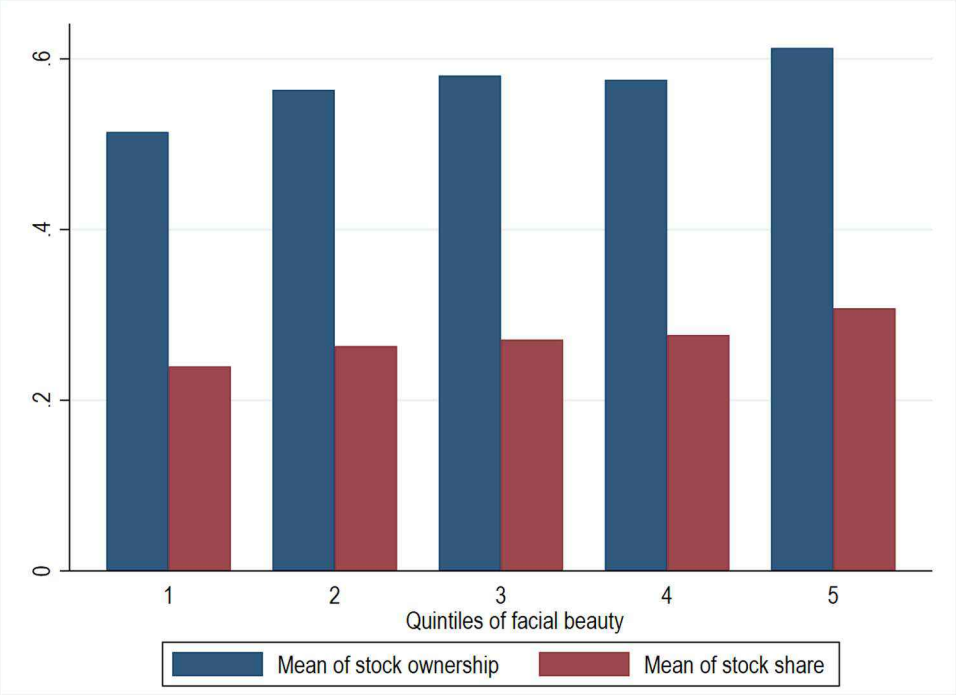

Fig. 2. Facial beauty and stock market participation. This figure plots mean stock ownership and stock share for each quintile of facial beauty. The data are from the WLS.

Table 2
Facial beauty and stock market participation.

	Stock ownership			Stock share		
	(1)	(2)	(3)	(4)	(5)	(6)
Facial beauty	0.0306***	0.0287***	0.0229***	0.0159***	0.0149***	0.0111***
	(0.0072)	(0.0072)	(0.0072)	(0.0034)	(0.0034)	(0.0033)
Female		-0.0234***	-0.0214***		-0.0120***	-0.0113***
		(0.0073)	(0.0072)		(0.0034)	(0.0033)
Number of siblings		-0.0132***	-0.0078***		-0.0082***	-0.0044***
		(0.0028)	(0.0029)		(0.0013)	(0.0014)
Father's education			0.0083***			0.0053***
			(0.0025)			(0.0012)
Mother's education			0.0032			0.0038***
			(0.0030)			(0.0013)
Ln(Parental income)			0.0164**			0.0092***
			(0.0070)			(0.0034)
Ln(Inheritance)			0.0183***			0.0090***
			(0.0023)			(0.0009)
Age FE	No	Yes	Yes	No	Yes	Yes
Observations	4702	4702	4702	4702	4702	4702
Pseudo R-squared	0.0028	0.0091	0.0258	0.0032	0.0123	0.0383

This table reports the estimates from regressions of stock market participation on facial beauty. The data are from the WLS. Columns (1)-(3) report the marginal effects from probit regressions of Stock ownership, while columns (4)-(6) report the marginal effects from Tobit regressions of Stock share. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

beauty is associated with a 1.11 percentage point increase in the weight allocated to equities. Relative to the mean portfolio share of stocks, which is 27.2%, the increase in allocation to equities represents a 4.08% increase in the portfolio share of stocks, suggesting that the effect of facial beauty on portfolio composition is economically meaningful. Overall, our findings indicate that facial beauty positively affects household stock market participation not only on the extensive margin but also on the intensive margin.

In addition to beauty, our control variables are significant predictors of stock market participation. Individuals who are female or have more siblings are less likely to take financial risks, while those with better family backgrounds are more likely to hold stocks.

3.2. Mechanism analysis

Given the positive effect of beauty on household stock market participation, it is important to shed light on the underlying mechanisms that drive this strong relationship. In what follows, we first explore the potential mediators governing the relationship between beauty and financial risk-taking. Motivated by the literature, we conjecture that the beauty effect may operate through six channels: (1) cognitive ability, (2) marital status, (3) health, (4) income, (5) psychological traits, and (6) sociability. We perform a standard mediation analysis to quantify the extent to which the mediating variables contribute to the beauty effect.

The first mechanism that we consider is cognitive ability. Previous literature has shown that attractive students receive preferential

treatment at school, such as receiving more attention from teachers and more favorable assessments of their academic performance (e.g., Bull and Rumsey 2012, Langlois et al. 2000, Judge et al. 2009). Positive teacher and peer interactions during schooling can increase academic achievement and motivation (Perry and Weinstein, 1998; Robbins et al., 2004), which in turn result in better cognitive development and higher educational attainment (Judge et al., 2009; Mocan and Tekin, 2010). Since cognitive skills affect one's ability to gather and process financial information, tasks that are crucial for portfolio choice, people with a higher IQ and higher educational attainment are more likely to invest in stocks (Christelis et al., 2010; Grinblatt et al., 2011; Cole et al., 2014; Black et al., 2018). Hence, the effect of beauty on stock market participation is possibly mediated by an increase in cognitive ability and schooling.

Second, beauty matters in the marriage market. Previous studies show that attractive individuals tend to enjoy a beauty premium in the marriage market (e.g., Hamermesh and Abrevaya 2013). In a broad portfolio framework, marriage can represent an asset that changes the risk profile of households and therefore influences their financial risk-taking (Bertocchi et al., 2011).

Third, beauty may signal better health (Rhodes et al., 2001). Health status has been shown to have a significant impact on individuals' investment decisions and portfolio choices (Rosen and Wu, 2004; Love and Smith, 2010; Yogo, 2016). Therefore, improved health can serve as a mechanism underlying the positive impact of beauty on stock market participation.

Fourth, beauty matters in the labor market. The literature has clearly established the existence of a beauty premium in the labor market (Mobius and Rosenblat, 2006; Scholz and Sicinski, 2015). Specifically, attractive individuals receive more favorable treatment in relation to job applications (Ruffle and Shtudiner, 2015), job interviews (Watkins and Johnston, 2000), performance evaluations (Landy and Sigall, 1974), and promotions (Mulford et al., 1998), and they have higher wages (Scholz and Sicinski, 2015). Therefore, beauty may influence both the level and the variability of the income of an individual. Because there are participation costs associated with stock investment (Haliassos and Michaelides, 2003), income is a crucial determinant of stock market participation (Campbell, 2006). In addition, beauty might increase stock market participation by decreasing income variability, which is an important background risk that crowds out financial risk-taking (Guiso et al., 1996; Angerer and Lam, 2009; Betermier et al. 2012; Bonaparte et al., 2014).

Fifth, beauty may affect a wide variety of psychological traits. For example, beauty may reduce depression (Datta Gupta et al., 2016); at the same time, mental health influences stock market participation (Bogan and Fertig, 2013). In addition, beauty can improve emotional states such as happiness (Hamermesh and Abrevaya, 2013), and prior studies have found that emotions affect household financial risk-taking (Kuhnen and Knutson, 2011; Bassi et al., 2013). Moreover, beauty can foster self-confidence. Better-looking people tend to receive preferential treatment and higher expectations as they grow up, both of which generate positive self-valuations and high levels of self-confidence (Mobius and Rosenblat, 2006). Self-confidence might increase people's subjective valuation of their financial competence. Because most households are not familiar with finance, a high level of self-confidence is needed to initiate the (often daunting) process of engaging in financial investment (Hadar et al., 2013; Farrell et al., 2016; Tang and Baker, 2016). Finally, since beauty can influence emotional status and confidence, it may also affect risk preference, which is an important determinant of financial market participation.

Sixth, beauty is related to sociability. The literature has shown that beauty helps individuals develop communication skills and fosters positive interactions with others (Jackson et al., 1995; Langlois et al., 2000; Mobius and Rosenblatt, 2006). Social interactions contribute to information diffusion through word-of-mouth communication or observational learning (Ellison and Fudenberg, 1995), thereby reducing the information barriers to stock market participation. For example, individuals may use their social networks, such as friends, neighbors, and colleagues, to glean information to make investment decisions. The role of social interactions in making investment decisions has long been documented in the literature (Hong et al., 2004; Georgarakos and Pasini, 2011; Changwony et al., 2015). Therefore, beauty might increase stock market participation by enhancing sociability.

We first investigate whether beauty is correlated with the above potential mediators. For this purpose, we employ two proxies for cognitive skills, namely, College and Test score, and use Married and Health as proxies for marital status and health. College is a dummy variable that equals one if the highest degree that the respondent has ever received is a college degree or above and zero otherwise. Test score is the standardized 11th grade Henmon–Nelson test score. Married is a dummy variable that equals one if the respondent is married and zero otherwise. Health is a categorical variable that measures the respondent's self-rated health on a scale of 1 ("very poor") to 5 ("excellent").[3]

Regarding the income channel, we consider three proxies, namely, Ln(Income), Income risk, and Ln(Wealth). Ln(Income) and Ln(Wealth) are the natural logarithm of total household income and wealth, respectively. Income risk measured as the standard deviation of log income over survey years. It is important to note that our assessment of income risk might be subject to limitations due to the relatively low data frequency and the inherent challenges associated with accurately quantifying uninsurable labor income risk (Fagereng et al., 2018).

In addition, we use four variables to measure psychological traits: Depression, Happiness, Self-confidence, and Risk aversion. Depression is the Center for Epidemiologic Studies Psychological Distress/Depression Scale (CES-D) scale. Happiness is a categorical variable that measures the degree of happiness on a scale of 1 ("so unhappy that life is not worthwhile") to 5 ("happy and interested in life"). Self-confidence is the standardized sum of scores for the responses to the five questions about self-confidence. Risk aversion is a categorical variable that measures the respondent's attitude toward the importance of having a low risk of losing job vs. high pay on a scale of 1 ("much less important") to 5 ("much more important"). Notably, the measurement of risk aversion in our study warrants specific attention. While prior research commonly measures risk aversion using questions related to financial risk-taking[4] (e.g., Malmendier and Nagel 2011, Kaustia et al. 2023), we confront the absence of such questions in the WLS data. In light of this limitation, we rely on a question about job risk to assess risk aversion, recognizing that this approach may introduce measurement errors. Additionally, we acknowledge that loss aversion and disappointment aversion can better explain the non-participation puzzle than risk aversion under standard utility functions like CRRA (Ang et al., 2005). Unfortunately, the availability of data within the WLS does not permit the exploration of these factors. Readers should bear in mind these limitations when interpreting our results.

Finally, we construct five measures of sociability: Charity organization, Training organization, Sports team, Church, and Political

[3] Following Rosen and Wu (2004), we use a self-reported health measure in our analysis. Self-reported health represents an overall summary of different aspects of one's health. A large literature documents the validity of self-reported health measures (Hurd and McGarry, 1995; Idler and Benyamini, 1997). The self-reported health variable in our data is significantly positively related with a measure of physical health used in Clark and Lee (2021) and negatively correlated with depression and BMI.

[4] For example, in the Survey of Consumer Finance (SCF), respondents are asked which of the following statements comes closest to describing the amount of financial risk that you are willing to take when you save or make the investments: (1) not willing to take any financial risk; (2) take average financial risks expecting to earn average returns; (3) take above average financial risks expecting to earn above average returns; (4) take substantial financial risks expecting to earn substantial returns.

organization. These measures are dummy variables that equal one if the respondent has been involved the corresponding type of organizations (i.e., charity organization, training organizations, sports teams, churches, and political organizations) in the last 12 months and zero otherwise. The detailed definitions of all the potential mediating variables are provided in Table A1.

The regression results are presented in Table 3. Panel A reports the results for the cognitive ability, marital status, and health channels, Panel B for the income channel, Panel C for the psychological traits channel, and Panel D for the sociability channel. As shown in Panel A of Table 3, the estimated effect of beauty is positive and significant in all four regressions, suggesting that more attractive individuals exhibit higher cognitive skills and are more likely to be married and in good health. Similarly, we find in Panel B that beauty enters positively and significantly into all the regressions, which indicates that more attractive individuals have higher levels of income and wealth and a lower level of income risk. For the psychological traits channel, we observe in Panel C that beauty is significantly positively correlated with happiness and self-confidence and significantly negatively correlated with depression and risk aversion. Finally, Panel D of Table 3 shows that the estimated effect of beauty is positive and significant in all the regressions of sociability measures. This finding reveals that people with higher levels of beauty tend to be more sociable and are likely to gain wider access to information through social interactions.

Overall, the results in Table 3 indicate that beauty is significantly associated with the potential mediators. However, these findings do not offer a clear indication of the relative contribution of each channel to the effect of beauty on stock market participation. To investigate the contribution of each channel, we follow the literature (Addoum et al., 2017; Black et al., 2018) and perform a standard mediation analysis in which we assess how the marginal effect of beauty changes when the mediating variables are added to the regressions as controls. Specifically, we compute the percent change in the marginal effect of beauty when a particular set of mediators is included and interpret that percent change as the proportion of the effect of beauty that is explained by the corresponding channel.

Table 4 presents the results of the mediation analysis. Panel A reports the marginal effects from probit participation regressions, while Panel B reports the marginal effects from Tobit asset allocation regressions. We first focus on Panel A. For comparison, we report the benchmark estimates with only basic controls in column (1) of Panel A. We then incrementally add the mediating variables to assess the degree to which these variables reduce the association between beauty and participation decisions. As shown in column (2), when we add the cognitive ability measures to the regression specification, the coefficient on education decreases from 0.0229 to 0.0225, indicating that 1.75% (i.e., (0.0229-0.0225)/0.0229=1.75%) of the beauty effect is explained by cognitive skills. In a similar fashion, we separately add the marital status, health,

Table 3
Facial beauty and potential mediators.

Panel A. Cognitive ability, marital status, and health				
	College	Test score	Married	Health
	(1)	(2)	(3)	(4)
Beauty	0.0164**	0.0276**	0.0142**	0.0465***
	(0.0066)	(0.0136)	(0.0059)	(0.0110)
Controls	Yes	Yes	Yes	Yes
Observations	4702	4702	4702	4702
Pseudo R-squared	0.1204	0.1158	0.0320	0.0191

Panel B. Income			
	Ln(Income)	Income risk	Ln(Wealth)
	(1)	(2)	(3)
Beauty	0.0723***	-0.0768**	0.0454**
	(0.0215)	(0.0388)	(0.0187)
Controls	Yes	Yes	Yes
Observations	4702	4702	4702
Pseudo R-squared	0.0299	0.0913	0.0360

Panel C. Psychological traits				
	Depression	Happiness	Self-confidence	Risk aversion
	(1)	(2)	(3)	(4)
Beauty	-0.0409***	0.0170**	0.0295**	-0.0283**
	(0.0139)	(0.0082)	(0.0145)	(0.0144)
Controls	Yes	Yes	Yes	Yes
Observations	4702	4702	4702	4702
Pseudo R-squared	0.0197	0.0065	0.0061	0.0278

Panel D. Sociability					
	Charity organization	Training organization	Sports team	Church	Political organization
	(1)	(2)	(3)	(4)	(5)
Beauty	0.0156**	0.0125**	0.0150***	0.0217***	0.0107**
	(0.0072)	(0.0057)	(0.0047)	(0.0074)	(0.0044)
Controls	Yes	Yes	Yes	Yes	Yes
Observations	4702	4702	4702	4702	4702
Pseudo R-squared	0.0084	0.0189	0.0353	0.0234	0.0092

This table reports the estimates from regressions of potential mediators on facial beauty. The data are from the WLS. In Panel A, the dependent variables are the cognitive ability, marital status, and health measures: College in column (1), Test score in column (2), Married in column (3), and Health in column (4). In Panel B, the dependent variables are the income measures: Ln(Income) in column (1), Income risk in column (2), and Ln(Wealth) in column (3). In Panel C, the dependent variables are the psychological traits measures: Depression in column (1), Happiness in column (2), Self-confidence in column (3), and Risk aversion in column (4). In Panel D, the dependent variables are the sociability measures: Charity organization in column (1), Training organization in column (2), Sports team in column (3), Church in column (4), Political organization in column (5). Probit models are used for College, Married, Charity organization, Training organization, Sports team, Church and Political organization, while OLS models are used for the other outcome variables. Marginal effects are reported for the probit regressions, while coefficients are reported for the OLS regressions. All regressions have the same controls as those in column (3) of Table 2, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

Table 4
Mediation analysis.

	Stock ownership							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Facial beauty	0.0229***	0.0225***	0.0207***	0.0205***	0.0184***	0.0212***	0.0189***	0.0139**
	(0.0072)	(0.0071)	(0.0071)	(0.0072)	(0.0070)	(0.0072)	(0.0072)	(0.0070)
College		0.0905***						0.0735***
		(0.0178)						(0.0178)
Test score		0.0196**						0.0146*
		(0.0082)						(0.0082)
Married			0.1399***					0.1172***
			(0.0172)					(0.0171)
Health				0.0502***				0.0282***
				(0.0099)				(0.0103)
Ln(Income)					0.0906***			0.0638***
					(0.0149)			(0.0148)
Income risk					-0.0057**			-0.0048*
					(0.0027)			(0.0027)
Ln(Wealth)					0.0502***			0.0473***
					(0.0061)			(0.0059)
Depression						-0.0109**		0.0027
						(0.0047)		(0.0047)
Happiness						0.0236***		0.0138**
						(0.0072)		(0.0070)
Self-confidence						0.0082***		0.0111***
						(0.0018)		(0.0020)
Risk aversion						-0.0147**		-0.0039
						(0.0073)		(0.0072)
Charity organization							0.0424***	0.0310**
							(0.0158)	(0.0156)
Training organization							0.0440**	0.0395**
							(0.0200)	(0.0198)
Sports team							0.0860***	0.0633***
							(0.0237)	(0.0235)
Church							0.0390***	0.0297**
							(0.0149)	(0.0146)
Political organization							0.0174	0.0431*
							(0.0249)	(0.0245)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,702	4,702	4,702	4,702	4,702	4,702	4,702	4,702
Pseudo R-squared	0.0258	0.0327	0.0357	0.0297	0.0619	0.0287	0.0358	0.0722
	Stock share							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Facial beauty	0.0111***	0.0109***	0.0101***	0.0100***	0.0081**	0.0100***	0.0086***	0.0062*
	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)	(0.0033)
College		0.0532***						0.0419***
		(0.0081)						(0.0081)
Test score		0.0111***						0.0037
		(0.0037)						(0.0037)
Married			0.0723***					0.0382***
			(0.0086)					(0.0092)
Health				0.0279***				0.0123**
				(0.0048)				(0.0049)
Ln(Income)					0.0609***			0.0466***
					(0.0087)			(0.0085)
Income risk					-0.0034***			-0.0024**
					(0.0013)			(0.0012)
Ln(Wealth)					0.0411***			0.0304***
					(0.0028)			(0.0028)
Depression						-0.0038		0.0038
						(0.0045)		(0.0044)
Happiness						0.0124*		0.0085
						(0.0068)		(0.0067)
Self-confidence						0.0045***		0.0030***
						(0.0009)		(0.0009)
Risk aversion						-0.0104***		-0.0033
						(0.0034)		(0.0033)
Charity organization							0.0235***	0.0144**
							(0.0072)	(0.0070)
Training organization							0.0214**	0.0176**
							(0.0087)	(0.0086)
Sports team							0.0585***	0.0428***
							(0.0103)	(0.0101)
Church							0.0223***	0.0162**
							(0.0068)	(0.0067)

(*continued on next page*)

Table 4 (*continued*)

	Stock share							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Political organization							0.0091	0.0162
							(0.0114)	(0.0111)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4702	4702	4702	4702	4702	4702	4702	4702
Pseudo R-squared	0.0383	0.0486	0.0488	0.0432	0.0760	0.0442	0.0473	0.1128

The table reports the estimates from regressions for mediation analysis. The data are from the WLS. Panel A reports the marginal effects from probit regressions of Stock ownership, while Panel B reports the marginal effects from Tobit regressions of Stock share. All regressions have the same controls as those in column (3) of Table 2, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

income, psychological traits, and sociability variables in columns (3)–(7), which results in a decrease in the marginal effect of beauty by 9.61%, 10.48%, 19.65%, 7.42%, and 17.47%, respectively. Moreover, we find that the significance level of the estimate of beauty drops when we add the income variables and sociability variables to the model. These findings suggest that while all the factors significantly influence the beauty–portfolio nexus, the income channel and the sociability channel appear to explain higher percentages of the effect of beauty on participation decisions than other channels and therefore constitute the most important pathways through which beauty affects stock ownership. When the possible mediating variables are added jointly in column (8), the estimate of beauty decreases to 0.0139, which implies that all the factors mentioned above could explain up to 39.3% of the effect of beauty on participation decisions.

We then turn to Panel B, which shows the mediation analysis results for asset allocation decisions. After calculations, we find that adding the six groups of mediating variables separately in columns (2)–(7) decreases the marginal effect of beauty on stock shares by 1.80%, 9.01%, 9.91%, 27.03%, 9.91%, and 22.52%, respectively. Hence, consistent with the results for stock ownership, the income channel and the sociability channel are more important than other channels in explaining asset allocation decisions. When we introduce all the possible mediators into the model in column (8), the estimate of beauty decreases to 0.0062 and loses much significance. Hence, all these factors could jointly explain up to 44.14% of the effect of beauty on asset allocation decisions.

Notably, more than half of the beauty effect remains unexplained after including all the channel variables. Some prior studies have similar findings on this point. For example, using the same WLS data, Scholz and Sicinski (2015) find that even after controlling for a lengthy list of observable attributes, including intelligence, sociability, personality, and family background, more than 60% of the beauty effect on labor market earnings is unexplained. One explanation they propose is that beauty could be an intrinsically productive characteristic in the labor market. Recent studies have also shown that a large portion of heterogeneity in household financial decisions is explained by biological/genetic factors (Cesarini et al., 2010; Cronqvist and Siegel, 2014; Barth et al., 2020). Given that beauty is largely ingrained in our biology, it is also possible that part of the beauty effect is innate. Another possible explanation is that our mediating variables, such as income risk and risk aversion, may be subject to measurement error, which can undermine the precision of the mediation analysis. Due to data limitations, we acknowledge that we cannot fully explore this issue and must leave it to future studies.

3.3. Robustness checks

3.3.1. Heterogenous effect by gender

In this section, we examine whether the effect of beauty differs by gender. Existing studies find mixed results regarding which gender benefits more from beauty. There is evidence suggesting that the effect of beauty does not vary significantly between genders (Fletcher, 2009; Harper, 2000; Wong and Penner, 2016). In contrast, a large strand of the literature documents that beauty matters more for women (French, 2002; Johnson et al., 2010) or for men (Rooth, 2009; Hamermesh, 2011).

Theoretically, beauty might matter more for women than for men because of the importance of beauty to the feminine gender role. Despite changing gender role norms, physical beauty continues to be a major criterion for women's social roles as wives and child bearers (Baker-Sperry and Grauerholz, 2003; Jeffreys, 2014; Rhode, 2010). In particular, traditional male role norms place more emphasis on masculinity, which, in contrast to femininity, is constructed on qualities such as control, strength and power (Connell, 1995). Thus, men might be rewarded less for beauty if beauty is treated as a feminine quality. In addition, gender differences in workplace power might result in a higher beauty premium for women. Men more often hold managerial positions and become rule makers in the workplace (Haveman and Beresford, 2012). Some studies find that male managers are more inclined to discriminate in favor of attractive female workers than their female counterparts, and the evaluation of male workers' performance is less affected by beauty (Kaplan, 1978; Wong and Penner, 2016).

However, there are also reasons to believe that beauty matters more for men than for women. For example, attractive women tend to be assigned the label of femininity, which is antithetical to the masculinized ideal worker norm and disadvantages attractive women in the labor market (Heilman and Saruwatari, 1979; Acker, 1990). In particular, attractive women may be discouraged and penalized from entering positions of authority and leadership (Heilman and Stopek, 1985; Johnson et al., 2010). In addition, some scholars argue that the beauty premium is larger for men based on expectancy violation theory, which suggests that behaviors that go against stereotypical norms can sometimes turn out to be beneficial (Rudman and Fairchild, 2004). Specifically, because beauty is commonly considered a feminine characteristic, beauty may be viewed as a particularly unexpected trait for men. As a result, individuals might use the characteristic of beauty more to distinguish men from other men than to distinguish women from other women (Kwan and Trautner, 2009; Patel and Wolfe, 2021). Consistent with this argument, Little et al. (2012) find that a higher level of beauty increases the perceptions of leadership potential for a man.

To explore the role of gender in our sample, we split the sample by gender and examine the beauty effect separately for men and women. Given the theoretical and empirical ambiguities regarding the gender gap in the beauty effect documented in the literature, we do not have a prior judgment of whether beauty matters more for men or women in our study. The regression results are presented in Table 5. For brevity, we report only the main estimates of interest. In both the male and female samples, beauty has significant positive impacts on the extensive and intensive margins of stock market participation. With respect to the difference in the estimates of beauty, we find that the seemingly unrelated regression (SUR) test statistic is insignificant for the regressions of both stock ownership and stock share. Taken together, these results indicate that there is no significant difference in the impact of beauty on stock market participation between men and women.

Table 5
Beauty and stock market participation, heterogenous effect by gender.

	Stock ownership		Stock share	
	Male (1)	Female (2)	Male (3)	Female (4)
Beauty	0.0279***	0.0176*	0.0153***	0.0088*
	(0.0098)	(0.0105)	(0.0045)	(0.0050)
Controls	Yes	Yes	Yes	Yes
Observations	2574	2128	2574	2128
Pseudo R-squared	0.0231	0.0315	0.0249	0.0393
SUR test statistic	0.49 ($p = 0.4842$)		1.69 ($p = 0.1934$)	

This table reports the estimates from regressions of stock market participation on facial beauty in male and female samples, respectively. The data are from the WLS. Male and Female indicates the male and female samples, respectively. Columns (1), (2) report the marginal effects from probit regressions of Stock ownership, while columns (3), (4) report the marginal effects from Tobit regressions of Stock share. All regressions have the same controls as those in column (3) of Table 2, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

3.3.2. Alternative definition of beauty

Findings from some prior studies suggest that the effects of beauty on individuals' socioeconomic outcomes might be non-monotonic and lie at the extremes. For example, using average-looking people as the reference group, Hamermesh and Biddle (1994) find that the plainness penalty for unattractive people is larger than the beauty premium for attractive people. In contrast, Wong and Penner (2016) do not find evidence of a plainness penalty but find that attractive and very attractive individuals have significantly higher earnings than other people. A recent study by Kanazawa and Still (2018) shows that very unattractive individuals earn significantly more than unattractive individuals and can even earn more than average-looking and attractive individuals.

To explore this issue, we divide facial beauty ratings into quintiles. We treat people in the middle quintile of beauty as the benchmark group and construct four dummy variables indicating the other beauty quintile groups. Table 6 shows the regression results using this alternative definition of beauty. We find that compared with average-looking people, people in the top beauty quintile are significantly more likely to participate in the stock market, while those in the bottom quintile are significantly less likely to participate in the stock market. This result is consistent with our benchmark findings and indicates that there exists both a beauty premium and a plainness penalty with respect to financial risk-taking.

Table 6
Facial beauty and stock market participation, alternative definition of beauty.

	Stock ownership (1)	Stock share (2)
1st quintile	-0.0419***	-0.0141**
	(0.0149)	(0.0069)
2nd quintile	-0.0114	-0.0039
	(0.0150)	(0.0068)
Base: 3rd quintile		
4th quintile	0.0061	0.0078
	(0.0150)	(0.0068)
5th quintile	0.0376**	0.0249***
	(0.0151)	(0.0067)
Controls	Yes	Yes
Observations	4,702	4,702
Pseudo R-squared	0.0263	0.0390

This table reports the estimates from regressions of stock market participation on facial beauty using an alternative definition of beauty. The data are from the WLS. Respondents are classified into quintiles by facial beauty ratings and those in the third beauty quintile are used as the base group. Column (1) reports the marginal effects from probit regressions of Stock ownership, while column (2) reports the marginal effects from Tobit regressions of Stock share. All regressions have the same controls as those in column (3) of Table 2, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

3.3.3. Additional control variables

In the benchmark analysis, we might not be able to rule out the possibility that the impact of beauty on stock market participation is confounded by other physical attributes. Addoum et al. (2017) show that relatively tall individuals are more likely to participate in the market, while relatively overweight individuals (those with a higher BMI) exhibit a weaker propensity to participate in the market. Their findings imply that failing to account for aspects of stature, such as height and weight, may bias our estimates. To address this concern, we include these factors as additional control variables. Specifically, we follow Addoum et al. (2017) and construct two proxies for these aspects of stature, namely, Relative height and Relative BMI.[5] Relative height is defined as the difference between the height of an individual and the gender–age group mean height. Relative BMI is defined in a similar fashion.

Table 7 presents the results of regressions with additional control variables. We first include Relative height and Relative BMI separately and then include them jointly in the regression models. We observe that stock market participation is positively correlated with Relative height and is negatively correlated with Relative BMI. This result suggests that individuals who are relatively tall and have relatively balanced weight are more likely to participate in the stock market, which is consistent with Addoum et al. (2017). More importantly for our purpose, we find that adding these variables does not alter the sign or significance of the estimates of beauty. Taken together, these findings suggest that the positive relationship between beauty and stock market participation is robust to the inclusion of stature.

3.3.4. Evidence from the Add Health data

Another commonly used measure of beauty is based on the interviewer's assessment of the respondent's attractiveness (Mocan and Tekin, 2010; Hamermesh and Abrevaya, 2013). In this section, we examine whether our results are robust to the use of this alternative measure. For this purpose, we use data from the restricted version of Add Health. Add Health was designed to study the impact of the social environment (i.e., friends, family, neighborhood, and school) on the behaviors of adolescents in the United States. The survey selected 80 nationally representative high schools and 54 feeder schools and first gave a questionnaire to all students in the schools in grades 7–12 during the academic year 1994–95 (Wave I). Within each school, a sample of students was then interviewed at home and asked many detailed questions. This in-home survey was administered to approximately 20,000 students, and these students formed the sample for the following waves of the survey conducted in 1995–1996 (Wave II), 2001–2002 (Wave III) and 2008–09 (Wave IV). We mainly use data from Wave III because it is the only wave that contains information on stock market participation.

Add Health includes the interviewer's evaluation of the respondent's physical attractiveness. Specifically, at the end of each interview, the interviewer completed a short survey to assess several of the respondent's characteristics. Regarding the beauty of the respondent, the interviewer was asked the following question: "How physically attractive is the respondent?" There were five possible answers: (1) very unattractive, (2) unattractive, (3) about average, (4) attractive, and (5) very attractive. Based on this question, we construct the categorical variable Physical attractiveness, which measures the interviewer's rating of physical attractiveness on a scale of 1 ("strongly agree") to 5 ("strongly disagree").

We only consider stock market participation on the extensive margin

[5] BMI stands for body mass index, which is defined as weight divided by height squared, where weight is measured in kilograms and height is measured in meters.

Table 7
Facial beauty and stock market participation, additional control variables.

	Stock ownership			Stock share		
	(1)	(2)	(3)	(4)	(5)	(6)
Facial beauty	0.0228***	0.0199***	0.0198***	0.0110***	0.0094***	0.0094***
	(0.0072)	(0.0072)	(0.0072)	(0.0033)	(0.0033)	(0.0033)
Relative height	0.4573**		0.4219**	0.2433***		0.2259***
	(0.1910)		(0.1904)	(0.0873)		(0.0870)
Relative BMI		-0.2539***	-0.2507***		-0.1439***	-0.1427***
		(0.0455)	(0.0455)		(0.0215)	(0.0216)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4,702	4702	4702	4702	4702	4702
Pseudo R-squared	0.0267	0.0306	0.0314	0.0394	0.0447	0.0456

This table reports the estimates from regressions of stock market participation on facial beauty with additional control variables. The data are from the WLS. Relative height is defined as the difference between the respondent's height and the gender–age group mean height. Relative BMI is defined as the difference between the respondent's BMI and the gender–age group mean BMI. Columns (1)–(3) report the marginal effects from probit regressions of Stock ownership, while columns (4)–(6) report the marginal effects from Tobit regressions of Stock share. All regressions have the same controls as those in column (3) of Table 2, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

(Stock ownership) because Add Health does not provide information on financial wealth. To capture the innate aspect of beauty in the Add Health data to the best extent, we include an array of controls, including age, gender, race, and number of siblings. In addition, we control for parental characteristics to isolate the effects of family background. Because beauty might be in the eye of the beholder, we also include interviewer fixed effects. Finally, we include school fixed effects.

Table 8 presents the results obtained from the Add Health data. As shown in column (1), the estimate of physical attractiveness is positive and highly significant. This result suggests that physical attractiveness is positively associated with the likelihood of investing in stocks, which is consistent with our benchmark results. In economic terms, a one-standard deviation increase in physical attractiveness is associated with a 2.36 percentage point increase in the probability of holding stocks. Relative to the unconditional participation propensity of 24.5%, this represents a 9.63% increase in the probability of participating in the stock market. This evidence shows that the effect of physical attractiveness on stock market participation is both statistically and economically significant.

In columns (2)-(8), we perform a mediation analysis similar to that in Table 4. Specifically, we classify the potential mediators into six groups: (1) cognitive ability (College and Test score); (2) marital status (Married); (3) health (Health); (4) income (Ln(Income)); (5) psychological traits (Depression, Happiness, Pride, Like myself, Everything right, Good qualities, and Risk aversion); and (6) sociability (Popularity, Talk with friends, Church, Community center, Service organization, and Educational group). The detailed definitions of these variables are provided in the caption of Table 8. Note that we do not control for income risk and wealth because this information is not available in the Add Health.

We observe from Table 8 that among all the potential mediators, the inclusion of sociability variables results in the largest significant decreases in the estimated marginal effect of facial attractiveness. This finding indicates that the impact of facial attractiveness on household portfolio choice operates mainly through an improvement in sociability. Nevertheless, since the physical attractiveness measure may be subject to measurement error and information on wealth and income risk is missing, the results obtained from the Add Health data should be interpreted with caution.

4. Conclusion

In this paper, we investigate the impact of beauty on stock market participation. Using a photo-based measure of facial beauty, we find that more attractive individuals are more likely than less attractive individuals to own stocks and invest a larger share of their wealth in stocks. The mediation analysis shows that the impact of beauty on stock market participation is partly explained by the impacts of beauty on cognitive ability, marital status, health status, income and wealth, psychological traits, and sociability, which are the underlying factors that influence this relation, with income and sociability in particular playing more important roles. A large portion of the beauty effect remains unexplained after all the channel variables are included. A subsample analysis shows that the impacts of beauty are significant in both the male and female subsamples. Finally, using another dataset that contains the interviewer's ratings on the respondent's physical attractiveness, we find similar results regarding the effects of beauty on stock market participation.

While the idea that beauty pays is not new, prior studies on the economic returns to beauty mostly focus on labor market outcomes such as wages and employment. By turning to portfolio choice decisions, our findings provide a new perspective to further understand how beauty may affect individuals' economic wellbeing. Our study also sheds light on how the distribution of natural endowments, such as beauty, can contribute to explaining the heterogeneity in stock market participation among the population. Because earning equity returns is important for wealth accumulation in the long run, our study indicates that policies that facilitate access to the stock market could be useful in reducing beauty-related social stratification and inequality.

CRediT authorship contribution statement

Hongwu Gan: Data curation, Formal analysis, Software, Visualization. **Shengfeng Lu:** Validation. **Weijie Lu:** Data curation, Formal analysis, Writing – review & editing. **Geng Niu:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Project administration. **Yang Zhou:** Conceptualization, Methodology, Writing – original draft, Writing – review & editing, Project administration.

Declaration of Competing Interest

All authors declare no conflict of interest.

Data availability

The authors do not have permission to share data.

Table 8
Physical attractiveness and stock market participation.

	Stock ownership							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Physical attractiveness	0.0285***	0.0246***	0.0282***	0.0263***	0.0267***	0.0259***	0.0192***	0.0153***
	(0.0045)	(0.0044)	(0.0045)	(0.0045)	(0.0044)	(0.0045)	(0.0049)	(0.0048)
College		0.0572***						0.0598***
		(0.0103)						(0.0104)
Test score		0.0454***						0.0419***
		(0.0054)						(0.0055)
Married			0.0830***					0.0891***
			(0.0092)					(0.0092)
Health				0.0187***				0.0073*
				(0.0042)				(0.0043)
Ln(Income)					0.0083***			0.0076***
					(0.0009)			(0.0009)
Depression						-0.0125		-0.0072
						(0.0118)		(0.0117)
Happiness						0.0097**		0.0066
						(0.0048)		(0.0048)
Pride						0.0272***		0.0173**
						(0.0075)		(0.0075)
Like myself						0.0028		-0.0010
						(0.0055)		(0.0054)
Everything right						0.0205***		0.0139**
						(0.0058)		(0.0058)
Good qualities						0.0141*		0.0143**
						(0.0073)		(0.0073)
Risk aversion						-0.0038		-0.0050
						(0.0034)		(0.0034)
Popularity							0.0164***	0.0132***
							(0.0046)	(0.0048)
Talk with friends							0.0279***	0.0210***
							(0.0081)	(0.0081)
Church							0.0322***	0.0194*
							(0.0115)	(0.0113)
Community center							0.0527***	0.0493***
							(0.0122)	(0.0120)
Service organization							0.0416***	0.0374**
							(0.0162)	(0.0161)
Educational group							0.0006	0.0099
							(0.0133)	(0.0131)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,308	13,308	13,308	13,308	13,308	13,308	13,308	13,308
Pseudo R-squared	0.1286	0.1370	0.1339	0.1299	0.1337	0.1325	0.1335	0.1541

This table reports the marginal effects from probit regressions of the stock market participation dummy on physical attractiveness. The data are from Add Health. Physical attractiveness is a categorical variable that measures the interviewer's rating of physical attractiveness on a scale of 1 ("strongly agree") to 5 ("strongly disagree"). College is a dummy variable that equals one if the highest degree that the respondent has ever received is a college degree or above and zero otherwise. Test score is the standardized Peabody Picture Vocabulary test score. Married is a dummy variable that equals one if the respondent is married and zero otherwise. Health is a categorical variable measures the respondent's self-rated health on a scale of 1 ("poor") to 5 ("excellent"). Ln(Income) is the natural logarithm of total household income. Depression is a dummy that equals one if the respondent has been diagnosed with depression over the past 12 months and zero otherwise. Happiness is a categorical variable that is constructed based on the response to the question "In the past 12 months, how often have you laughed a lot" on a scale of 1 ("never") to 5 ("every day"). Pride is a categorical variable that measures the degree to which the respondent agrees with the statement "I have a lot to be proud of" on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). Like myself is a categorical variable that measures the degree to which the respondent agrees with the statement "I like myself just the way I am" on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). Everything right is a categorical variable that measures the degree to which the respondent agrees with the statement "I feel like I am doing everything just about right" on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). Good qualities is a categorical variable that measures the degree to which the respondent agrees with the statement "I have a lot of good qualities" on a scale of 1 ("strongly disagree") to 5 ("strongly agree"). Risk aversion is a categorical variable that measures the degree to which the respondent agrees with the statement "I like to take risks" on a scale of 1 ("strongly agree") to 5 ("strongly disagree"). Popularity is a categorical variable that measures the respondent's self-assessment of his or her popularity on a scale of 1 ("not at all popular") to 4 ("very popular"). Talk with friends is the number of times that the respondent visited or talked with friends in the week before the interview. Church is a dummy variable that equals one if the respondent has been involved with church or church-related organizations in the last 12 months and zero otherwise. Community center is a dummy variable that equals one if the respondent has been involved with community centers in the last 12 months and zero otherwise. Service organization is a dummy variable that equals one if the respondent has been involved with service organizations in the last 12 months and zero otherwise. Educational group is a dummy variable that equals one if the respondent has been involved with educational groups in the last 12 months and zero otherwise. All regressions control for age fixed effects, gender, race, number of siblings, and parental characteristics, but their estimates are suppressed for brevity. Robust standard errors are reported in parentheses. The 1%, 5%, and 10% significance levels are denoted by ***, **, and *, respectively.

Appendix

Table A1
Variable definitions.

Variable	Definition
Stock ownership	A dummy variable that equals one if the respondent owns stocks and zero otherwise.
Stock share	The fraction of financial assets invested in stocks
Facial beauty	The standardized facial beauty score constructed from ratings of yearbook photographs from the respondent's senior year of high school.
Age	The respondent's age.
Female	A dummy variable that equals one if the respondent is female and zero otherwise.
Number of siblings	The number of siblings that the respondent has.
Father's education	The number of years of schooling that the respondent's father has received.
Mother's education	The number of years of schooling that the respondent's mother has received.
Ln(Parental income)	The natural logarithm of total parental income.
Ln(Inheritance)	The natural logarithm of total value of inheritance in money, property, or other assets.
College	A dummy variable that equals one if the highest degree that the respondent has ever received is a college degree or above and zero otherwise.
Test score	The standardized 11th grade Henmon–Nelson test score.
Married	A dummy variable that equals one if the respondent is married and zero otherwise.
Health	A categorical variable that measures the respondent's self-rated health on a scale of 1 ("very poor") to 5 ("excellent").
Ln(Income)	The natural logarithm of total household income.
Income risk	The standard deviation of log income over survey years.
Ln(Wealth)	The natural logarithm of total household wealth.
Depression	The Center for Epidemiologic Studies Psychological Distress/Depression Scale (CES-D) scale. This scale is calculated from 20 questions that are designed to test depressive feelings and behaviors over the past week.
Happiness	A categorical variable that measures the degree of happiness on a scale of 1 ("so unhappy that life is not worthwhile") to 5 ("happy and interested in life").
Self-confidence	The standardized sum of scores for the responses to the following five questions: (1) "In general, I feel confident and positive about myself"; (2) "When I compare myself to friends and acquaintances, it makes me feel good about who I am"; (3) "In many ways, I feel disappointed about my achievements in life"; (4) "When I look at the story of my life, I am pleased with how things have turned out"; (5) "I like most aspects of my personality". The answers to these questions are given on a scale of 1 ("Agree strongly") to 6 ("Disagree strongly"). We reversely code the answers to questions (1), (2), (4), and (5) to ensure that high values indicate higher levels of self-confidence.
Risk aversion	A categorical variable that measures the respondent's attitude toward the importance of having a low risk of losing a job vs. high pay on a scale of 1 ("much less important") to 5 ("much more important").
Charity organization	A dummy variable that equals one if the respondent has been involved with charity or welfare organizations in the last 12 months and zero otherwise.
Training organization	A dummy variable that equals one if the respondent has been involved with business training organizations in the last 12 months and zero otherwise
Sports team	A dummy variable that equals one if the respondent has been involved with sports teams in the last 12 months and zero otherwise.
Church	A dummy variable that equals one if the respondent has been involved with churches or church-related organizations in the last 12 months and zero otherwise.
Political organization	A dummy variable that equals one if the respondent has been involved with political organizations in the last 12 months and zero otherwise.

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