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Stature, Obesity, and Portfolio Choice

Jawad M. Addoum,[a] George Korniotis,[b] Alok Kumar[b]

[a] Charles H. Dyson School of Applied Economics and Management, Cornell University, Ithaca, New York 14853; [b] School of Business Administration, University of Miami, Coral Gables, Florida 33124

Contact: jaddoum@cornell.edu (JMA); gkorniotis@miami.edu (GK); akumar@miami.edu (AK)

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Abstract. Using multiple U.S. and European data sources, we show that observed physical attributes are related to participation in financial markets. Specifically, we find that individuals who are relatively tall and of normal weight are more likely to hold stocks in their financial portfolios. We consider several potential mechanisms that could drive the relation between physical attributes and portfolio decisions. We find that teenage social experiences as well as genetic and prenatal endowments that are fixed at birth are the two channels through which height affects financial decisions. Furthermore, we find that the relation between body mass index and portfolio decisions is largely driven by education and race.

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1. Introduction

A growing literature spanning psychology and economics examines the impact of people's physical attributes on their behaviors and socioeconomic outcomes. Two attributes that have received particular attention are height and weight. For example, the labor literature demonstrates that taller individuals have higher earnings, with a 1%–2% increase in salary for each extra inch of height. Explanations for this premium include taller individuals being smarter and better educated (Case and Paxson 2008b), having higher confidence and self-esteem due to positive teenage social experiences (Persico et al. 2004), and self-selecting into better paying occupations (Gowin 1915). In contrast, obesity is associated with a negative wage premium. Hamermesh and Biddle (1994) find a weight penalty in the labor market using American and Canadian survey data, while Harper (2000), using British data, shows that obese women earn lower wages but obese men do not experience a pay penalty. Despite evidence that physical attributes influence earnings and a wide range of other measurable outcomes such as self-esteem (Adams 1980, Melamed 1994, Mocan and Tekin 2011), cognitive abilities (Case and Paxson 2008b), and success in marriage markets (Harper 2000), relatively little is known about how directly observable physical attributes affect investment decisions.

In this paper, we fill this gap in the literature by examining whether a person's height and body mass index (BMI)[1] are important determinants of financial preferences and stock market participation. To our knowledge, this is the first study to directly examine how physical attributes affect portfolio decisions. Our main conjecture is that people's physical attributes could evoke environmental responses that would in turn affect their risk-taking behavior. Specifically, physical attributes may shape certain elements of individuals' personalities (e.g., sociability, optimism, self-esteem, and trust) that are known to influence economic and financial decisions. For example, Dohmen et al. (2010) find that taller individuals are more risk tolerant and, consequently, they may choose to take greater financial risk. Furthermore, Stunkard et al. (2003), Dong et al. (2004), and Gariepy et al. (2010) find that obese individuals are less optimistic and face higher risks of depression, which suggests that they may also take less financial risk (Puri and Robinson 2007).[2]

Understanding the relation between physical attributes and portfolio decisions also provides the opportunity to separate the effects of biological and social factors on individuals' financial decision making. Specifically, the effects associated with observable phenotypes such as height and body mass are likely to be influenced by factors that are fixed at birth, such as genetics or the prenatal environment. However, they are also likely to capture the effects of social experiences and environmental feedback related to these phenotypes. For example, Cronqvist and Siegel (2015) demonstrate that while individuals are born with a specific genetic predisposition to save, parenting and the childhood environment are also important determinants of savings rates. Similarly, D'Acunto (2015) shows that gender differences in risk tolerance are driven not only by biology, but also by social identity stereotypes. In this paper, we try to understand the relative importance of these biological and social channels as determinants of stock market participation.

Our main finding is that height and BMI are both correlated with investment decisions. Individuals who are relatively tall and of normal weight are more likely to participate in financial markets. Specifically, we estimate market participation regressions in which the main independent variables are *relative* height and *relative* BMI. Relative height is defined as the difference between the height of an individual and the group mean height, where the group mean is specific to the country, gender, age, and interview year. Relative BMI is defined in an analogous manner. Since our data include male and female respondents across several countries and cohorts, these two relative measures capture the potential benefits (or disadvantages) of physical appearance more effectively than raw height and BMI.

Using four data sets from the United States and Europe, we find that relatively taller individuals are more likely to participate in the market, while relatively overweight individuals with a higher BMI exhibit a weaker propensity to participate in the market. Furthermore, consistent with the evidence from height studies in other economic settings, we find that the beneficial effects of height are weaker for very tall individuals.

We also investigate several potential channels that might drive the relation between physical attributes and financial decisions. On the one hand, these channels are motivated by the existing evidence of height and BMI affecting economic determinants of portfolio choice, such as income, net worth, and education. On the other hand, the channels are motivated by an attempt to explicitly separate biological from social mechanisms. Our empirical approach is similar to the method used by Persico et al. (2004) to identify the channels through which height affects labor market outcomes. Specifically, we group control variables into categories corresponding to various channels that may explain the relation between physical attributes and portfolio decisions. We then examine the degree to which each group reduces the association between height, BMI, and portfolio decisions.

We begin our analysis using data from the Survey of Health, Aging, and Retirement in Europe (SHARE), the Dutch National Bank Household Survey (DHS), and the Health and Retirement Survey (HRS). First, we examine the effect of income and net worth on the relationship between physical characteristics and stock market participation. In particular, Persico et al. (2004) document a relationship between height and income, showing that taller individuals tend to earn more. Across the SHARE, DHS, and HRS data sets, we find that including linear and squared income and net worth controls explains a portion of the relationship between height, BMI, and portfolio decisions.

Second, we consider whether financial sophistication related to cognitive abilities mediates the relationship between height, BMI, and market participation. Controlling for education as a proxy for financial sophistication and cognitive abilities (e.g., Lusardi and Mitchell 2007, 2011), our results suggest that this channel may also be partially responsible for the relationship between height, BMI, and portfolio choice.

Next, we examine whether the portfolio choice effects associated with height and BMI can be explained by respondents' health status. In addition to being an important determinant of stock market participation (Rosen and Wu 2003), Guthrie and Sokolowsky (2017) show that health risk partially explains the link between obesity and credit risk. Across the three data sets, we find that including a self-assessed health measure leads to statistically significant decreases in the portfolio choice effects of both relative height and relative BMI. However, despite the statistical strength of the mediating effect of health, the decreases in the height and BMI coefficient estimates are small relative to those we observe when controlling for the cognitive abilities channel.

Finally, we consider the mediating effect of sociability on the observed effects of height and BMI on portfolio decisions. This channel is motivated by the findings of Hong et al. (2004), who show that individuals who are more sociable have about a 4% higher probability of participating in the stock market. If those who are relatively short or obese are less likely to engage in social interactions, then measures of sociability may help to explain the effects we document. Our results based on the SHARE and HRS data suggest that sociability explains some of the effect associated with height, but that the inclusion of sociability controls contributes little to explaining the effect of relative BMI on stock participation.[3]

To better identify the relative importance of the channels through which physical attributes and portfolio decisions are related, we provide additional evidence using the National Longitudinal Survey of Youth (NLSY) and exploit a unique feature of the data set. NLSY respondents reported measures of height in both 1981 and 1985. We focus on the sample of respondents who were teenagers in 1981 and find that the relation between height and portfolio decisions is driven by relative height during teenage years and not by adult height reported in 1985. Respondents who grew tall earlier than their peers are the ones who exhibit a greater propensity to participate in the market as adults. This suggests that the underlying channel(s) must be correlated with height as a teenager, which may reflect the effects of genetics as well as experiences during childhood through teenage years.

In particular, the association between physical attributes and financial decisions may reflect factors that are fixed at birth, such as genetics or the prenatal environment. For example, Sundet et al. (2005) find that 35% of the height–intelligence correlation can be attributed to genetic factors. More recently, Cronqvist et al. (2016) show that higher prenatal testosterone exposure leads to greater financial decisions adulthood. Furthermore, financial decisions and physical attributes could both capture positive early childhood experiences, such as better nutrition, education, and growing up in a healthier family environment. For example, Peck and Lundberg (1995) show that adult height is positively correlated with economic and social conditions during childhood. Conti and Heckman (2010) find that adult obesity is also affected by such conditions. Case and Paxson (2008b) demonstrate that height affects labor market outcomes through better cognitive development in early childhood.

Finally, positive social experiences during teenage years could lead to greater self-esteem and, in turn, a greater willingness to take on financial risks. Persico et al. (2004) show that tall teenagers have better social experiences in high school, leading to greater professional success during adulthood. In contrast, obesity may translate to negative social experiences. For example, Cairney et al. (2008) find that weight-related social stigma is a driver of anxiety. Furthermore, Vartanian (2010) shows that the extent of social discrimination against overweight individuals is comparable to that against smokers and drug addicts. Pope and Sydnor (2011) and Duarte et al. (2012) provide evidence that such discrimination translates to peer-to-peer lending markets, in which obese individuals are subject to lower funding rates and pay higher spreads.

We exploit the availability of a rich set of control variables in the NLSY to explicitly examine whether childhood experiences shaped by family background and social experiences during teenage years can explain the relation between teenage height and portfolio decisions. We find that family background variables such as parental education, occupation, and involvement in child rearing have little explanatory power. However, teenage experiences such as participation in extracurricular high school clubs and athletics explain over half of the teen height effect. Furthermore, we find that self-esteem as a teenager, which is positively correlated with participating in these extracurricular activities, is a significant predictor of market participation in adulthood.

We also consider whether genetic factors can partially explain the relation between height and portfolio decisions. Specifically, we examine the incremental effect of a genetic endowment channel by jointly controlling for respondents' teenage experiences and their aptitude scores on the Armed Forces Qualification Test (AFQT).[4] We find that the intellectual endowments captured in the AFQT score explain the remainder of the teen height effect not captured by teenage experiences. Together, these findings suggest that the link between height and stock market participation is driven by a combination of teenage social effects and genetic as well as prenatal endowments that are fixed at birth.

Focusing on the effects of relative BMI, we find that the set of family background controls and the portion of AFQT scores attributable to genetics each explain a portion of the relation between BMI and stock market participation. We also find that the bulk of the explanatory power of BMI is captured by education and race.

We also examine whether health risk and impatience are channels through which obesity could influence individuals' financial decisions. Since obesity is associated with greater health risk and such risk has been shown to affect portfolio decisions (e.g., Rosen and Wu 2003), the relation between BMI and financial risk may be driven by health risk. Furthermore, obese individuals have been shown to exhibit greater impatience (e.g., Courtemanche et al. 2015), indicating that those with high BMI may avoid investing in stocks due to impatience. While we find that both our health risk and impatience measures are important determinants of portfolio decisions, they do not fully explain the relation between BMI and participation decisions.

Collectively, our empirical results contribute to the rich literature on the determinants of stock market participation decisions. Previous studies have suggested that traditional factors such as wealth, income, age, education, and risk aversion affect stock market participation decisions (e.g., Campbell 2006). Other factors that are known to affect market participation decisions include health risk (Rosen and Wu 2003), social interactions (Hong et al. 2004), optimism (Puri and Robinson 2007), cognitive abilities (Christelis et al. 2010, Grinblatt et al. 2011), participation cost (Bonaparte and Kumar 2013), and income hedging motives (Bonaparte et al. 2014). We add to this literature by demonstrating that observable physical attributes are also important determinants of portfolio decisions. Consistent with the findings of Cesarini et al. (2010) and Barnea et al. (2010), we show that the relation between physical attributes and stock participation is shaped by both experiences and factors that are fixed at birth.

The rest of this paper is organized as follows. In the next section, we provide a brief description of the data sets used in the study. Our main empirical results are presented in Sections 3 and 4. We conclude in Section 5 with a brief discussion.

2. Data and Summary Statistics

Our empirical analysis uses four major data sets, which contain detailed information about investment decisions of households in Europe as well as the United

States. In this section, we briefly describe those data sets and report combined as well as data set-specific summary statistics. Section A in the online appendix provides additional details about these data sets.

2.1. Main Data Sources

Our first data source is the Survey of Health, Aging, and Retirement in Europe. We consider data from the two main waves of this survey. Wave 1 was administered in 2004 and 2005 and wave 2 was administered in 2006 and 2007. The survey is administered in 13 European countries to individuals who are at least 50 years old. The sample is representative of European households, and it includes countries from all key European regions: Scandinavia (Denmark and Sweden), central Europe (Austria, France, Germany, Switzerland, Belgium, Czech Republic, Poland, and Netherlands), and Mediterranean (Spain, Italy, and Greece). All countries are part of both waves with the exception of the Czech Republic and Poland, which are only part of wave 2.

One of the key advantages of the SHARE data set is that the main personality correlates of height identified in previous studies are available for each individual. In addition, this data set captures multiple dimensions of investment decisions, including participation decisions in various markets and asset allocation choices. Overall, the SHARE data contain rich and detailed information about the demographic characteristics, personality attributes, and financial decisions of a large sample of European households.

A key limitation of the SHARE data set is that it focuses on individuals who are at least 50 years old and does not contain direct measures of risk aversion, although the data set has several risk aversion proxies such as age and wealth. For robustness, we use data from the Dutch National Bank Household Survey, which contain information about individuals across all age groups. The DHS data have been used in a few recent studies, including Alessie et al. (2004) and Guiso et al. (2008).

We use the Health and Retirement Study data from the United States to ensure that our results obtained from European data sets generalize to U.S. households. The HRS data are used in several recent studies, including Barsky et al. (1997), Rosen and Wu (2003), and Hong et al. (2004). In addition, we use data from the National Longitudinal Survey of Youth from the United States. Unlike the HRS, which contains individuals who are at least 50 years old, the NLSY sample contains individuals who were 14 to 22 years old in 1979.

2.2. Merged Data

In our main empirical analysis, we would ideally like to use the data from all four sources jointly. Unfortunately, it is difficult to merge all four data sets because many variables, especially the personality attributes, are either not available or are not measured uniformly across the four data sets. However, because the DHS and the SHARE data sets are modeled after the HRS, we are able to estimate reduced regression specifications using the merged data from SHARE, DHS, and HRS sources. For these three data sets, we also estimate data set-specific extended regression specifications. The specifications estimated using all three data sets include control variables that are available in all three data sets. This core set of control variables includes age, education, income, gender, and marital status.[5] The data set-specific regressions include additional control variables that are available only in that specific data set.

The NLSY has a unique structure and therefore we examine it separately from the other data sets. Specifically, the NLSY only contains information about the overall decision to own stocks, bonds, and mutual funds. In the other data sets, we are able to separate the ownership in stocks and mutual funds from bond ownership. Since bonds are substantially less risky than stocks and mutual funds, in our main analysis, we exclude the NLSY and focus exclusively on the SHARE, DHS, and HRS data sets.

2.3. Summary Statistics

Table 1 reports the summary statistics for the main variables used in the key empirical analysis, and Table IA.I in the online appendix contains the summary statistics for the NLSY sample. For ease of interpretation, we group these variables into three categories. The first category contains financial decision variables that are the dependent variables in our analysis, while the other two categories contain the determinants of those financial decisions. This set includes height and body mass index, other demographic variables, cognitive abilities, optimism, health, and social interactions. All these variables are briefly defined in Section C of the online appendix.

The summary statistics are consistent with the previous evidence on stock market participation rates. For example, we find that the majority of households do not participate in the stock market. The total stock market participation rate, which includes both individual stocks and mutual funds, is 36% in the SHARE and 29% in the HRS.[6] In the DHS data set, the total market participation rate is lower (= 17%) because the DHS sample includes younger individuals who participate less in the market. The bond market participation rates are even lower across the three data sets: 9% in the SHARE, 7% in the HRS, and only 3% in the DHS. Conditional upon participation, investors in the SHARE, DHS, and HRS allocate 25%, 40%, and 37% of their financial wealth in stocks and mutual funds, respectively.

Table 1. Summary Statistics

	All data sets (1–3)			SHARE (4–6)			DHS (7–9)			HRS (10–12)		
	Mean	Std. dev.	Median	Mean	Std. dev.	Median	Mean	Std. dev.	Median	Mean	Std. dev.	Median
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Main decision variables												
Own Stocks or Mutual Funds	0.30	0.46		0.36	0.48		0.17	0.38		0.29	0.46	
Own Stocks				0.29	0.45		0.09	0.28				
Own Mutual Funds				0.27	0.44		0.12	0.33				
Own Bonds	0.07	0.25		0.09	0.29		0.03	0.17		0.07	0.25	
Prop in Stocks or MF	0.11	0.23		0.10	0.21		0.08	0.21		0.12	0.24	
Prop in Stocks				0.05	0.14		0.03	0.12				
Prop in MF				0.05	0.14		0.05	0.15				
Prop in Bonds	0.02	0.09		0.03	0.13		0.01	0.04		0.01	0.07	
Prop in Stocks or MF, Cond	0.33	0.30	0.24	0.25	0.27	0.09	0.40	0.29	0.34	0.37	0.30	0.29
Prop in Stocks, Cond				0.14	0.22	0.01	0.29	0.26	0.21			
Prop in MF, Cond				0.17	0.21	0.05	0.33	0.26	0.27			
Prop in Bonds, Cond	0.22	0.23	0.13	0.31	0.26	0.23	0.16	0.11	0.15	0.17	0.21	0.09
Relative height and weight												
Rel Height × 100		4.00	−0.04		3.50			3.70			4.20	−0.09
Rel BMI × 100		18.00	−2.20		15.00	−1.60		15.00	−1.70		20.00	−2.60
Height and weight, females												
Height (in cm)	163.50	6.86	163.00	162.61	6.45	163.00	168.14	6.44	168.00	162.75	6.68	163.00
Weight (in kg)	72.84	16.31	70.00	69.57	13.20	68.00	70.58	13.77	69.00	74.83	17.75	73.00
BMI	27.26	5.94	26.27	26.31	4.78	25.71	24.96	4.64	24.16	28.23	6.44	27.40
Height and weight, males												
Height (in cm)	176.98	7.46	178.00	174.18	7.17	174.00	180.18	7.23	180.00	177.05	7.16	178.00
Weight (in kg)	84.41	14.71	82.00	81.03	12.67	80.00	82.64	12.84	82.00	86.74	15.86	84.00
BMI	26.92	4.25	26.37	26.69	3.79	26.23	25.43	3.55	25.06	27.62	4.53	27.11
Other demographics												
Age	62.00	13.00	62.00	65.00	10.00	64.00	48.00	15.00	47.00	64.00	11.00	63.00
Education	0.36	0.48		0.21	0.41		0.54	0.50	1.00	0.38	0.48	
Ln(*Income*)				10.00	0.96	10.00	10.00	1.10	11.00	10.00	1.10	10.00
Income Index	0.42	0.28	0.56	0.07	0.09	0.04	0.09	0.10	0.06	0.63	0.09	0.63
Ln(*Net Worth*)				12.00	1.60	12.00	11.00	2.30	11.00	12.00	1.80	12.00
Net Worth Index	0.07	0.12	0.03	0.03	0.07	0.01	0.07	0.01	0.02	0.08	0.13	0.04
Male	0.43	0.50		0.46	0.50		0.55	0.50	1.00	0.40	0.49	
Single	0.29	0.45		0.26	0.44		0.18	0.38		0.31	0.46	
Leave Inheritance				58.00	43.00	80.00				62.00	41.00	80.00
Unemployed	0.20	0.40	0.00	0.21	0.41		0.10	0.29		0.23	0.42	
Retired	0.40	0.49	0.00	0.50	0.50	1.00	0.26	0.44		0.39	0.49	
Risk Aversion										8.20	2.40	8.70
Numerical Ability				3.40	1.10	4.00				1.70	0.58	2.00
Verbal Ability				19.00	7.50	18.00						
Memory				4.90	1.90	5.00				9.90	3.50	10.00
Optimism				9.70	2.20	10.00				5.40	1.40	6.00
Overall Health				1.10	0.29	1.00	1.80	0.40	2.00	1.40	0.49	1.00
Social Activities Index				0.82	1.10							
Religious Participation				0.11	0.32					0.42	0.49	

Notes. This table reports the summary statistics for the main variables used in the empirical analysis. All variables are defined in Section C of the online appendix. "Prop" stands for proportion. The "Cond" rows report the statistics only for individuals who participate in the market. Columns (1)–(3) report summary statistics across all three data sets. Columns (4)–(6) report summary statistics based on the three waves of the Survey of Health, Aging, and Retirement in Europe (SHARE). Columns (7)–(9) report the statistics from the 1993 to 2009 waves of the Dutch National Bank Household Study (DHS). Finally, columns (10)–(12) report statistics from the 1992 to 2008 waves of the Health and Retirement Survey (HRS) from the United States. Missing values in cells for a variable–data set pair indicate that the variable is not available in that data set.

Examining the demographic characteristics of individuals in the SHARE sample, we find that the average height and weight among females are about 163 cm and 70 kg, respectively. Among males in the SHARE sample, the average height and weight are about 174 cm and 81 kg, respectively. In the DHS (HRS) data set, the average height among females is about 168 cm (163 cm), and the average weight is about 71 kg (75 kg). Among males, the average height in the DHS (HRS) is about 180 cm (177 cm), and the average weight is about 83 kg (87 kg). The mean BMI, a measure of obesity, is about 27 and does not vary significantly across genders and data sets. Examining the age of respondents, we find that the average respondent in the SHARE and HRS is more than 60 years old, whereas the typical respondent in the DHS data set is about 48 years old. There is also considerable variation in education level across the SHARE, DHS, and HRS data sets, where about 21%, 54%, and 38% of individuals have completed college, respectively. Furthermore, across those three data sets, about 50%, 26%, and 39% of individuals are retired, respectively. The split across gender is even. About half of the respondents in all data sets are male.

Focusing on other demographic attributes, we find that SHARE participants have good numerical and verbal abilities, but their average memory is relatively weaker. On average, they are able to answer three out of five mathematical problems correctly, can name 19 animals in one minute, but are able to recall less than half of the words read to them. Their optimism levels are also high. The typical respondent in the SHARE participates in one social activity and is less likely to participate in religious activities.

The average respondent in the HRS also has relatively good numerical skills but weak memory and recall abilities. On average, the HRS respondents are able to answer 1.7 out of 2 mathematical problems correctly and can recall about half of the questions read to them. Last, the younger DHS participants are healthier than the older (50 or above) respondents in the SHARE and the HRS data sets.

Compared to the HRS, the NLSY focuses on a younger cohort of the U.S. population, with an average age of 37 years. The sample is evenly split between men and women. About 43% of the participants are single, and about one-third of them are college graduates. The NLSY participants have similar average height (170 cm) and average weight (76 kg) compared to the other three data sets.

In addition to these demographic attributes, the NLSY data set contains information about family background and high school activities that are not available in the other data sets. Specifically, we find that fewer than 15% of individuals have a parent that graduated from college, and about 7% have a parent who holds a professional job. About 37% of the participants did not participate in any high school activities, 40% of them were involved in athletic activities, and most of them participate in at least one social activity.

Examining the financial decisions of NLSY households, we find that only 18% of them participate in the stocks market, and, conditional upon participation, they allocate about 15% of their wealth in stocks, bonds, or mutual funds. The stock market participation rate is lower than the 30% participation rate in the HRS but close to the 17% average participation rate in the DHS. This evidence is not surprising because, like the DHS participants, the NLSY participants are mostly young adults who are in the early stages of their careers and life cycles.

Overall, the personality attributes of individuals in the SHARE and HRS data sets are consistent with our expectations about the typical European or American who is nearing retirement. Similarly, the DHS and NLSY individuals fit the profile of younger and educated Dutch and American individuals, respectively. We also find that there is significant cross-sectional variation in all personality attributes within the three data sets, which allows us to examine the relation between observed physical attributes and financial decisions effectively.

3. Stature, Obesity, and Risky Financial Decisions

In this section, we present our main empirical results. Using data from multiple sources, we provide strong support for our main conjecture, which posits that taller individuals would take greater financial risks, while obese people would favor less risky investment choices.

3.1. Graphical Evidence

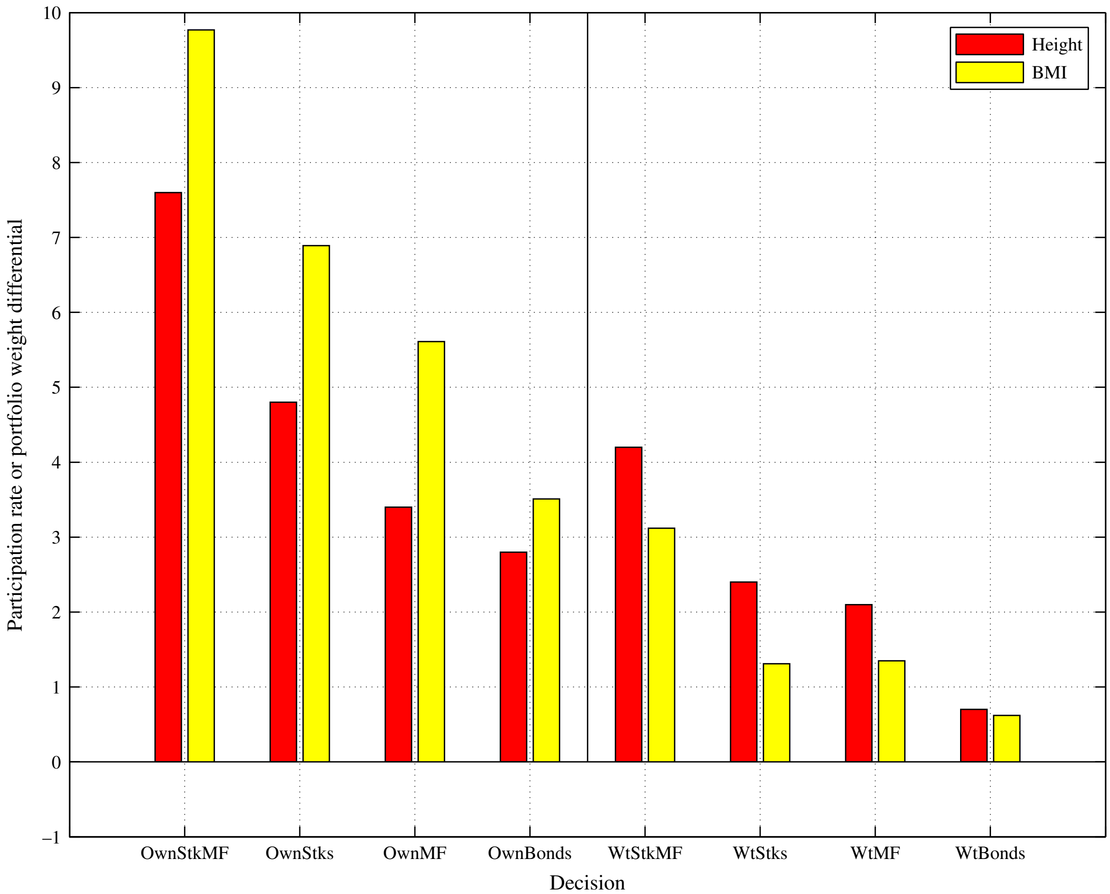
We begin our main empirical analysis with one-dimensional sorts on *relative* height and *relative* BMI to show that peer-adjusted observed physical attributes are correlated with different types of risky financial decisions. Specifically, we first compute relative height and weight by subtracting from the respondent's height (weight) an average height (weight) based on age, gender, country, and survey year. Then, we sort respondents into quintiles based on relative height and relative BMI measures separately and report the mean participation rates for various financial decision variables. These one-dimensional sorting results are relatively easier to interpret, and they remain qualitatively similar even when we consider a multivariate estimation framework and account for other known determinants of participation decisions.

We summarize these findings in Figure 1, where we report the average participation rates measured across all countries. Our evidence indicates that both relatively tall and relatively normal-weight individuals are more willing to take financial risks. In particular, they participate more in equity and bond markets. We find a similar but weaker pattern when we examine the portfolio allocations to risky assets. We find that relatively tall and relatively normal-weight individuals allocate a larger proportion of their financial wealth to risky assets.

3.2. Estimation Framework

To study the relation between physical characteristics and financial decisions more accurately, we estimate a series of market participation regressions. The two

Figure 1. (Color online) Participation Rate Differential for Various Risky Decisions



Notes. This figure shows the mean participation rate and portfolio weight differentials between (i) tall and short and (ii) normal and obese weight individuals. The tall and short categories correspond to the highest and the lowest relative height quintiles, respectively. The normal and obese weight categories correspond to the second and the highest relative BMI quintiles, respectively. The ownership rate and portfolio weight differentials for the following four risky decisions are shown: (i) stocks or mutual funds ownership, (ii) stock ownership, (iii) mutual fund ownership, and (iv) bond ownership. All variables are defined in Section C of the online appendix. All participation rate differential estimates are significant at least at the 5% level.

main independent variables in the regression specifications are *relative* height and the *relative* body mass index. The relative measures can better capture the benefits and drawbacks of physical appearance conditional on the social group she belongs to. In the regressions, we also include a quadratic height term to capture the potential nonlinearity in the relation between height and financial decisions.[7]

Our empirical approach is similar to the method used by Persico et al. (2004) to identify the channels through which height affects labor market outcomes. Specifically, we group control variables into categories corresponding to various channels that may explain the relation between physical attributes and portfolio decisions. We then examine the degree to which each group reduces the association between height, BMI, and portfolio decisions.[8]

Our selection of control variables is motivated by the portfolio choice literature and the set of controls includes the well-known determinants of stock market participation summarized by Campbell (2006), among others. In particular, we include a basic set of controls that includes age, squared age, and indicators for gender and marital status of the respondent in our baseline specifications. We then incrementally add various groups of controls to assess the degree to which each group reduces the association between height, BMI, and portfolio decisions. These groups of controls are motivated by the recent literature on portfolio choice.

First, we consider the effect of income and net worth on the relationship between physical characteristics and market participation. In particular, Persico et al. (2004) document a relationship between height and income, showing that taller individuals tend to earn more. In contrast, Hamermesh and Biddle (1994) and Harper (2000) find a weight penalty in the labor market. This suggests that an income channel may be responsible for the observed relation between height, BMI, and portfolio decisions. Furthermore, Campbell (2006) documents the importance of linear and squared income and net worth on portfolio choice decisions. Hence, we include both linear and squared terms in controlling for this channel.

Next, we consider whether cognitive abilities mediate the relationship between height, BMI, and portfolio risk taking. Case and Paxson (2008b) demonstrate that height is correlated with innate abilities. Furthermore, obesity is associated with deficits in decision making (e.g., Celone et al. 2011, Nummenmaa et al. 2012). Since intelligence has been shown to be a significant determinant of stock market participation (Grinblatt et al. 2011), we control for education in examining the effect of cognitive abilities.

In addition, we consider whether the effects associated with physical characteristics can be explained by health-related risks. For example, Guthrie and Sokolowsky (2017) show a link between obesity and credit risk and demonstrate that this link is partially driven by health risk among the obese. Furthermore, Case and Paxson (2008a) demonstrate that taller individuals have better health status. In turn, Rosen and Wu (2003) show that households reporting poor health allocate less of their financial portfolios to risky assets. Motivated by these studies, we include a self-reported measure of health available across all three data sets as an additional control.

Beyond these control variables that are available across the SHARE, DHS, and HRS data sets, we also examine each of the data sets separately. In these data set-specific tests, we exploit the availability of unique additional control variables that might help to shed additional light on the drivers of our key results. For example, we are able to control for measures of numerical ability and memory in the SHARE and HRS data sets in evaluating the mediating effect of cognitive abilities. We also include verbal ability in this group of controls in the SHARE data set. Furthermore, we consider the effects of optimism, shown by Puri and Robinson (2007) to affect financial risk taking, in both the SHARE and HRS data.

Finally, we consider the mediating effects of social interaction by including controls for social activities and religious participation in the SHARE- and HRS-specific specifications. Hong et al. (2004) show that higher levels of social interaction are associated with higher stock market participation rates. Height and BMI are also related to the propensity to engage in social interactions. For example, Persico et al. (2004) show that taller teenagers participate more in social activities such as athletics and school clubs. Vartanian (2010) finds that social discrimination against the overweight is severe. Cairney et al. (2008) conjecture that weight-related social stigma might cause anxiety among the obese. Given these findings, including social interaction control variables may explain the relationship between height, BMI, and portfolio decisions.

To ensure that our results are not influenced by the unobserved heterogeneity across countries and across time, most of our specifications include country and year fixed effects.[9] We estimate participation regressions using probit specifications and asset allocation regressions using the Tobit framework. Since we have observations on the same household over multiple survey waves, in all specifications, we obtain the z-statistics using standard errors clustered at the household level.

3.3. Market Participation and Asset Allocation Regression Estimates

We examine the market participation decisions using probit regressions and report the results in Table 2. In the first market participation regression, we examine whether height influences the decision to participate in the stock market. We consider the total participation rate that combines direct participation through holding stocks and indirect participation through mutual fund ownership. We combine data from the SHARE, DHS, and HRS to estimate these regressions.

When we do not account for the other known determinants of stock market participation (see column (1)), we find that relative height has a significantly positive coefficient estimate (estimate = 0.663, z-statistic = 8.98). As expected, the coefficient estimates of relative height become weaker as we include other control variables in the regression specification. For example, in specification (4), where we include the basic set of control variables and use country as well as year fixed effects, the estimate of relative height decreases but remains significantly positive (estimate = 0.642, z-statistic = 8.61).

In economic terms, the relative height coefficient estimates in specification (4) indicate that a one standard deviation increase in relative height surrounding the mean population height is associated with a $0.642 \times 4 = 2.57\%$ increase in the probability to participate in the stock market. Relative to the unconditional participation propensity of 30%, this represents a $100 \times 2.57/30 = 8.57\%$ increase in the participation probability. This evidence indicates that the relation between height and stock market participation is significant, both statistically and economically.

In contrast to the estimates of relative height, relative BMI has significantly negative estimates in all specifications. This evidence indicates that individuals with higher BMI exhibit a lower propensity to participate in the stock market. In statistical terms, the relative BMI estimates are often as strong as the relative height estimates. Examining the economic significance of the relative BMI estimate in specification (4), we find that a one standard deviation decrease in relative BMI is associated with a $0.228 \times 18 = 4.10\%$ increase in the probability to participate in the stock market. Relative to the unconditional participation propensity of 30%,

Table 2. Market Participation Probit Regression Estimates

Indep. var.	No controls (1)	No controls (2)	No controls (3)	Basic controls (4)	Basic and income controls (5)	Basic and cognitive controls (6)	Basic and health controls (7)	Basic + Controls (8)
Rel Height	0.663	0.713	0.666	0.642	0.376	0.446	0.587	0.260
	(8.98)	(9.34)	(8.81)	(8.61)	(5.44)	(6.09)	(8.03)	(3.78)
Rel Height^2		−9.080	−9.058	−8.417	−6.080	−7.837	−7.734	−5.791
		(−6.11)	(−6.21)	(−5.80)	(−4.64)	(−5.62)	(−5.49)	(−4.50)
Rel BMI			−0.220	−0.228	−0.179	−0.195	−0.182	−0.139
			(−14.01)	(−14.33)	(−12.14)	(−12.68)	(−11.61)	(−9.52)
Age × 100				0.101	0.215	0.240	0.171	0.330
				(3.70)	(7.97)	(8.84)	(6.32)	(12.26)
Age^2 × 100				0.002	0.002	0.001	0.001	0.001
				(0.93)	(1.34)	(0.29)	(0.79)	(0.69)
Male Dummy				0.074	0.031	0.055	0.072	0.024
				(12.86)	(5.68)	(9.54)	(12.66)	(4.38)
Single Dummy				−0.099	−0.029	−0.098	−0.094	−0.038
				(−16.76)	(−4.86)	(−16.92)	(−16.02)	(−6.57)
Income					1.377			1.139
					(30.39)			(26.87)
Income^2					−1.173			−0.924
					(−11.50)			(−9.93)
Net Worth					0.755			0.594
					(19.31)			(15.26)
Net Worth^2					−0.835			−0.672
					(−14.09)			(−11.34)
Education						0.194		0.131
						(31.86)		(22.09)
Good Health							0.124	0.069
							(23.30)	(13.66)
Country fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	117,524	117,524	117,524	117,524	117,524	117,524	117,524	117,524
Pseudo R^2	0.035	0.036	0.042	0.061	0.118	0.095	0.073	0.137
[*p*-value: Rel.H.(3) = Rel.H.]				[0.213]				
[*p*-value: Rel.BMI(3) = Rel.BMI]				[0.002]				
[*p*-value: Rel.H.(4) = Rel.H.]					[0.000]	[0.000]	[0.000]	[0.000]
[*p*-value: Rel.BMI(4) = Rel.BMI]					[0.000]	[0.000]	[0.000]	[0.000]

Notes. This table reports the marginal effects from probit regressions of the market participation dummy on relative height, relative body mass index, and other known determinants of market participation. The dependent variable is the total stock market participation dummy, which takes a value of one if an individual holds individual stocks or mutual funds and zero otherwise. Sample observations are pooled across the SHARE, DHS, and HRS data sets. All variables are defined in Section C in the online appendix. The z-statistics are reported in parentheses below the coefficient estimates, which are computed using standard errors clustered at the household level.

this represents a $100 \times 4.10/30 = 13.67\%$ increase in the participation probability.

We also examine the effects of extreme height on market participation decisions. We find that the squared relative height variable has significantly negative coefficient estimates in all specifications. This evidence indicates that while taller individuals are more likely to participate in the stock market, the market participation propensity is somewhat lower among the very tall.

Next, we estimate bond participation regressions as well as direct and indirect equity market participation regressions. For brevity, we report the results of these specifications in Table IA.II in the online appendix. The results of these regressions indicate that stock and mutual fund participation rates are higher for relatively taller individuals and lower for relatively overweight individuals. Furthermore, the estimates of the squared relative height variable indicate that very tall and very short individuals exhibit a lower propensity to hold mutual funds, but a slightly higher propensity to hold bonds.

To further understand how the risk-taking behavior of individuals varies with height, we examine investors' asset allocation decisions using Tobit regressions. In the first set of asset allocation tests, we use the proportion of total financial wealth invested in stocks and mutual funds as the dependent variable.

Consistent with the total market participation regression estimates, we find that relatively taller individuals allocate a larger proportion of their wealth to riskier assets (i.e., stocks and mutual funds), while individuals with relatively higher BMI allocate a smaller proportion of their wealth to those assets. We find these results for the full sample that combines all data sets as well as for data set-specific subsamples. For brevity, we report the results of these specifications in the online appendix, Table IA.III, panel A. We find similar results when we consider the weight allocated to only stocks, mutual funds, or bonds as the dependent variable. These results are presented in the online appendix, Table IA.III, panel B.[10]

3.4. Explaining the Relation Between Height, BMI, and Portfolio Decisions

In our next set of tests, we examine the degree to which the observed relation between height, BMI, and portfolio decisions can be explained by various mediating factors. As described earlier, we group control variables into categories corresponding to various channels that may explain the relation between physical attributes and portfolio decisions. This empirical approach is motivated by that of Persico et al. (2004) in identifying the channels through which height affects labor market outcomes.[11]

3.4.1. Income and Wealth Channel. We first examine the effect of income and wealth controls in column (5) of Table 2. After controlling for linear and squared income and net worth, we find that the strength of the relation between relative height, relative BMI, and market participation is dampened. Specifically, the magnitude of the relative height coefficient decreases from 0.642 in column (4) to 0.376 in column (5). This decrease is statistically significant, with a Wald test p-value of 0.000. Furthermore, we find that the magnitude of the relative BMI coefficient also decreases significantly (p-value = 0.000), from −0.228 with basic controls in column (4) to −0.179 in column (5). These results suggest that the relationship between height, BMI, and portfolio decisions can be partially attributed to the environment feedback channel captured by income and net worth controls.

We find similar results when we consider data set-specific market participation regressions in Table 3.[12] In particular, we find that the addition of income and wealth controls in column (2) of all three panels in Table 3 leads to economically and statistically significant decreases in the role of relative height on participation. Furthermore, we find that the income and wealth controls lead to a statistically significant decrease in the magnitude of the relative BMI coefficient in both the SHARE and HRS samples, but that these additional controls have little effect in the DHS sample.

3.4.2. Cognitive Channel. Next, we control for education in addition to the basic controls. The estimates from the specification including observations from all of the data sets is presented in column (6) of Table 2. These estimates indicate that cognitive abilities may be partially responsible for the relationship between height, BMI, and portfolio choice. Specifically, we find that the coefficient of relative height decreases significantly in column (6) relative to column (4). We find even more pronounced effects when we consider data set-specific specifications in Table 3, where we also include controls for numerical ability, memory, and verbal ability in the data sets where these measures are available. In particular, the coefficients on relative height respectively decrease by 0.341 (p-value = 0.000) and 0.350 (p-value = 0.000) in the SHARE and HRS samples. The decrease in the relative height coefficient in the DHS sample, where controls in addition to education are unavailable, is statistically significant to a lesser degree (p-value = 0.059). The magnitude of the decrease (0.036) is also relatively smaller.

We also find that the relative BMI coefficient decreases significantly (p-value = 0.000) in column (6) of Table 2 using all three data sets. This decrease is also present in the data set-specific regressions in Table 3. Furthermore, this decrease is especially strong in the SHARE sample, where all three additional cognitive controls (numerical ability, memory, and verbal ability) are available. We interpret these results as suggesting that lower cognitive skills among the relatively short and obese may partially drive lower stock market participation.

3.4.3. Health Channel. We consider whether the portfolio choice effects associated with height and BMI can be explained by respondents' health status. In addition to being an important determinant of stock market participation (Rosen and Wu 2003), Guthrie and Sokolowsky (2017) show that health risk partially explains the link between obesity and credit risk. In the merged sample, we find that respondents who report being in good health have a higher propensity to participate in the market, consistent with the findings of Rosen and Wu (2003). Furthermore, we find that including the self-assessed health measure leads to statistically significant decreases in both the relative height and relative BMI coefficient estimates in column (7) of Table 2, compared to those in column (4).

In the data set-specific regressions in Table 3, we find that the respondent health explains a statistically significant portion of the effect associated with relative BMI across all three data sets. Furthermore, health explains some of the effect associated with relative height in the SHARE and HRS samples. However, despite the statistical strength of the mediating effect of health, the decreases in the height and BMI coefficient estimates are small relative to those we observe when controlling for the cognitive channel.

Table 3. Market Participation Probit Regression Estimates

Indep. var.	Basic Controls (1)	Basic and income controls (2)	Basic and cognitive controls (3)	Basic and health controls (4)	Basic and social controls (5)	All Controls (6)
Panel A: Regressions using the SHARE sample						
Rel Height	0.613	0.575	0.272	0.592	0.531	0.190
	(6.99)	(6.55)	(3.05)	(6.74)	(6.04)	(2.13)
Rel Height^2	0.660	0.791	1.744	0.819	1.069	2.159
	(0.38)	(0.45)	(0.98)	(0.47)	(0.61)	(1.21)
Rel BMI	−0.173	−0.168	−0.109	−0.156	−0.166	−0.087
	(−8.29)	(−8.04)	(−5.24)	(−7.45)	(−7.90)	(−4.12)
N	23,263	23,263	23,263	23,263	23,263	23,263
Pseudo R^2	0.165	0.167	0.200	0.167	0.176	0.222
[p-value: Rel. H. (1) = Rel. H.]		[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
[p-value: Rel. BMI (1) = Rel. BMI]		[0.000]	[0.000]	[0.000]	[0.015]	[0.000]
Panel B: Regressions using the DHS sample						
Rel Height	0.388	0.339	0.352	0.384	N/A	0.314
	(2.44)	(2.14)	(2.20)	(2.42)		(1.97)
Rel Height^2	−8.513	−8.060	−7.952	−8.428		−7.569
	(−2.75)	(−2.61)	(−2.55)	(−2.73)		(−2.44)
Rel BMI	−0.191	−0.188	−0.176	−0.186		−0.171
	(−5.05)	(−4.98)	(−4.65)	(−4.93)		(−4.52)
N	21,185	21,185	21,185	21,185		21,185
Pseudo R^2	0.055	0.059	0.063	0.056		0.066
[p-value: Rel.H.(1) = Rel.H.]		[0.000]	[0.059]	[0.526]		[0.001]
[p-value: Rel.BMI(1) = Rel.BMI]		[0.224]	[0.001]	[0.018]		[0.000]
Panel C: Regressions using the HRS sample						
Rel Height	0.794	0.720	0.444	0.687	0.795	0.389
	(4.49)	(4.16)	(2.55)	(3.92)	(4.49)	(2.26)
Rel Height^2	−10.708	−10.009	−10.593	−9.221	−10.701	−9.371
	(−3.07)	(−2.97)	(−3.19)	(−2.72)	(−3.06)	(−2.89)
Rel BMI	−0.299	−0.258	−0.261	−0.238	−0.299	−0.198
	(−8.64)	(−7.69)	(−7.70)	(−6.87)	(−8.65)	(−5.96)
N	16,468	16,468	16,468	16,468	16,468	16,468
Pseudo R^2	0.040	0.056	0.096	0.061	0.040	0.111
[p-value: Rel.H.(1) = Rel.H.]		[0.007]	[0.000]	[0.000]	[0.782]	[0.000]
[p-value: Rel.BMI(1) = Rel.BMI]		[0.000]	[0.003]	[0.000]	[0.778]	[0.000]

Notes. This table reports the marginal effects from probit regressions of the market participation dummy on relative height, relative body mass index, and other known determinants of market participation. The dependent variable is the total stock market participation dummy, which takes a value of one if an individual holds individual stocks or mutual funds and zero otherwise. In panel A, sample observations are from the SHARE data set. In panel B, sample observations are from the DHS data set. In panel C, sample observations are from the HRS data set. For brevity, only coefficient estimates for height and BMI regressors are reported. Coefficient estimates for all regressors are reported in Table IA.III in the online appendix. All variables are defined in Section C of the online Appendix. The z-statistics are reported in parentheses below the coefficient estimates, which are computed using standard errors clustered at the household level.

3.4.4. Social Interaction Channel. In our last set of tests, we consider the mediating effect of sociability. We focus on the SHARE and HRS samples for these tests, since the DHS sample does not include relevant measures of social interaction. This test is motivated by the findings of Hong et al. (2004), who show that individuals who are more sociable have about 4% higher probability of participating in the stock market. If those who are relatively short or obese are less likely to engage in social interactions, then measures of sociability may help to explain the effects we document.

The results in column (5) of Table 3 suggest that sociability explains some the effects associated with height. In particular, we find a statistically significant decrease in the relative height coefficient, from 0.613 to 0.531 (p-value of difference = 0.000), when we add controls for participation in social and religious activities in the SHARE data. However, we do not find such a decrease in the relative height coefficient in the HRS sample, perhaps because the only sociability index available is religious participation. In both the SHARE and HRS data, we find that the inclusion of sociability controls contribute little to explaining the effect of relative BMI on stock participation.

3.5. Robustness Checks and Additional Evidence

We conduct several tests to gather further support for our main conjecture and establish the robustness of our

Table 4. Robustness Tests

	Probit estimates (1–2)		Tobit estimates (3–4)	
	Own Stks	Own StksOrMF	Prop. Stks	Prop. StksOrMF
Indep. var.	(1)	(2)	(3)	(4)
Panel A: Use height and BMI quintiles (Q)				
Rel Height Q1	−0.021	−0.014	−0.053	−0.027
	(−2.51)	(−1.54)	(−2.60)	(−1.70)
Rel Height Q2	−0.010	0.017	−0.021	0.025
	(−1.26)	(1.88)	(−1.16)	(1.75)
Rel Height Q4	0.009	0.016	0.020	0.029
	(1.15)	(1.86)	(1.20)	(2.13)
Rel Height Q5	0.023	0.035	0.049	0.061
	(2.65)	(3.87)	(2.76)	(4.24)
Rel BMI Q1	0.004	0.016	0.009	0.025
	(0.54)	(2.23)	(0.64)	(2.14)
Rel BMI Q2	0.015	0.021	0.032	0.037
	(2.28)	(3.27)	(2.42)	(3.71)
Rel BMI Q4	−0.007	−0.018	−0.015	−0.036
	(−1.18)	(−3.04)	(−1.12)	(−3.63)
Rel BMI Q5	−0.021	−0.057	−0.042	−0.100
	(−3.16)	(−8.50)	(−2.67)	(−8.50)
Panel B: Gender-specific effects				
Rel Height	1.480	0.506	0.763	0.315
	(3.37)	(1.62)	(3.53)	(1.84)
Rel Height × Male	0.169	1.357	−0.011	0.707
	(0.27)	(3.16)	(−0.04)	(3.07)
Rel BMI	−0.327	−0.615	−0.144	−0.347
	(−3.39)	(−10.46)	(−3.28)	(−10.86)
Rel BMI × Male	−0.101	0.288	−0.043	0.164
	(−0.67)	(3.14)	(−0.62)	(3.39)

Notes. This table reports estimates from additional tests designed to examine the robustness of the main results. Columns (1) and (2) report marginal effects from probit participation regressions, while columns (3) and (4) report asset allocation Tobit estimates. In test 1, the main explanatory variables are dummy variables based on country-specific height and BMI quintiles. To avoid collinearity, the dummy variables corresponding to the third height and BMI quintiles are omitted. In test 2, we interact relative height and BMI with an indicator variable for whether the respondent is male. The estimates of control variables are suppressed to save space. The set of controls included in the regressions is identical to those used in column (8) of Table 2. All variables are defined in Section C of the online appendix. The z-statistics are reported in parentheses below the coefficient estimates, which are computed using standard errors clustered at the household level. Stks, stocks; StksOrMF, stocks or mutual funds.

baseline results. The results from these additional tests are summarized in Table 4.

3.5.1. Height and BMI Quintiles. Our baseline results show that market participation increases with height and decreases with BMI. It is possible that the relation between height, BMI, and financial decisions is nonlinear and our linear specifications generate biased estimates.

In test 1, we replace the continuous relative height and the relative BMI measures with dummy variables based on quintiles of relative height and relative BMI. We omit the dummy variables related to the middle quintile to avoid multicollinearity. The new estimates using height and BMI quintiles confirm our original findings. We find that individuals in the bottom (top) quintiles of height (BMI) participate less in the market, whereas individuals in the top (bottom) quintiles of height (BMI) have higher participation rates. Thus, our results are not somehow mechanically induced by our specific choice of regression specifications.

3.5.2. Gender-Specific Effects. In the next robustness test, we investigate whether the effects of height and BMI on financial decisions are stronger for men. Previous studies have documented a greater benefit of height for men. For example, Harper (2000) finds a height-related wage premium for men but not for women. Dohmen et al. (2010) show that tall women are more risk averse than tall men. It is also likely that the adverse effects of obesity are stronger among women than men.

Consistent with the evidence from these related studies, the results from test 2 indicate that the coefficient estimates of height are stronger among males in some specifications. Specifically, in the stock ownership probit and Tobit regressions, the coefficients of the interaction between relative height and male indicator are positive and statistically significant.

When we examine the gender-specific estimates of BMI, in most instances, we find the negative relation between relative BMI and mutual fund ownership is significantly stronger among females. Overall, the gender-specific estimates are consistent with the conjecture that men are influenced by taller stature more than women, while the adverse effects of obesity are weaker among men.

The overall conclusion we draw from these additional results is that our findings are not sensitive to the specific choice of the regression specifications. Furthermore, consistent with previous findings in the psychology literature, we find stronger positive effects of stature among men, while the adverse effects of obesity are weaker. Last, we provide additional evidence of a nonlinear relation between physical attributes and stock market participation.

4. Evidence Using the NLSY Data

In this section, we use the National Longitudinal Survey of Youth data set from the United States.[13] Other studies in finance have also used the NLSY data. For example, Angerer and Lam (2009) use the NLSY to study the impact of income risk on portfolio decisions.

The NLSY is a rich data set and offers several advantages. First, it allows us to better identify some of the potential channels through which physical appearance may affect investment decisions. Specifically, the NLSY data set includes several measures of family background and developmental experiences. These new variables allow us to examine how positive reinforcements during early childhood years and social experiences during teenage years shape the relation between observed physical attributes and investment decisions.

The NLSY data also allow us to complement the U.S. evidence obtained using the HRS data set, which only contains individuals who are at least 50 years old. The mean age of individuals in the NLSY sample is 37. Furthermore, the NLSY provides measures of height at two periods in time, which allows us to better examine the potential causal relation between height and investment decisions. One limitation of the NLSY data is that they only report the total market participation rate, which includes ownership in stocks, mutual funds, and bonds.

4.1. Market Participation Estimates: Teen Height vs. Adult Height

Similar to our previous analysis using the SHARE, DHS, and HRS data sets, we estimate probit market participation regressions.[14] The dependent variable in these regressions is the market participation dummy. The primary independent variables are relative height and relative BMI. We use two measures of relative height, one reported in 1981 and the other in 1985.[15] Following Persico et al. (2004), we restrict the sample to include those respondents who were 19 years of age or younger in 1981.[16] This yields a sample of respondents who were between the ages of 16 and 19 during 1981. We label the relative height as measured in 1981 as the teen height, and label the relative height in 1985 as the adult height. Similarly, we use two measures of relative BMI, one reported in 1981 and the other reported each survey year. We label the relative BMI as measured in 1981 as the teen BMI, and label the relative BMI measure as reported during each survey year as the current BMI.

The probit regression estimates are presented in Table 5. Before presenting the results from these estimates, we first describe those from untabulated specifications in which we find that both relative teen height and relative adult height are strong determinants of market participation decisions. We do not report these specifications in Table 5 in the interest of brevity. Specifically, with only year fixed effects as controls, we find that the coefficient estimate of relative teen height is 0.656 (z-statistic = 15.77). Similarly, the coefficient estimate of relative adult height is 0.645 (z-statistic = 15.06). The similarity in these two coefficient estimates is not surprising, given that tall teenagers also tend to be tall adults. For example, in our NLSY data, the correlation between adult and teen height measures is 0.843.

Next, we include the two relative height variables in the same specification. This allows us to estimate the effect of relative teen height (adult height) associated with market participation, conditional on relative adult height (teen height). Although about 80% of variation in final adult height is genetic (e.g., Case and Paxson 2008a), the age at which individuals achieve their final height is not fixed.[17] We posit that if the link between height and portfolio decisions is largely driven by biological factors, then the age at which individuals achieve their final height should not matter. In turn, relative teen height should not be important once we control for relative adult height. However, if relative teen height remains an important determinant of portfolio decisions in the presence of adult height, we interpret this as evidence that a characteristic correlated with teen height, such as positive social experiences, must be important.

We find that while both teen and adult height are important determinants of market participation decisions, teen height appears to be economically more important. Specifically, in a basic specification with only year fixed effects as controls, the coefficient estimate of relative teen height, holding relative adult height fixed, is 0.414 (z-statistic = 5.34). In contrast, the coefficient estimate of relative adult height, conditional on relative teen height, is 0.286 (z-statistic = 3.61).

Interestingly, the effect associated with relative adult height becomes economically and statistically insignificant once we add relative current BMI and relative teen BMI in column (1). However, holding relative adult height and the relative BMI measures constant, relative teen height remains a strong determinant of market participation, with a coefficient estimate of 0.644 (z-statistic = 5.93). In contrast, the coefficient estimates of the relative BMI measures in column (1) indicate that relative teen BMI is an economically and statistically weak determinant of market participation. On the other hand, relative current BMI is strongly linked to participation decisions, with a coefficient estimate of −0.190 (z-statistic = −9.02). The relative teen height and relative current BMI coefficient estimates in column (1) indicate that an individual who is in the highest teen height quartile has a 3.99% higher propensity to participate in the market relative to an individual in the lowest teen height quartile. Similarly, an individual who is in the highest current BMI quartile has a 4.46% lower propensity to participate in the market relative to an individual in the lowest current BMI quartile. Relative to the overall market participation rate of 18% in the sample, both of these implied magnitudes are economically significant.

The regression specification in column (1) is estimated using a subsample for which age, gender, race, marital status, income, and education controls are available. In column (2), we reestimate the same specification using a slightly different subsample for which a set of family background, teenage experience, health, and impatience controls are available. We find that the

Table 5. Participation Regression Estimates Using the NLSY Data

	No controls	No controls	Basic controls	Basic and income controls	Basic and cognitive controls	Basic + Controls	Family background controls	Teenage experience controls	Teenage and aptitude controls	Health controls	Impatience controls	All controls
Indep. var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Rel Teen Height	0.644	0.671	0.547	0.543	0.397	0.400	0.459	0.302	−0.112	0.684	0.650	−0.137
	(5.93)	(4.98)	(4.98)	(4.94)	(3.58)	(3.56)	(3.27)	(2.01)	(−0.81)	(5.08)	(4.64)	(−0.76)
Rel Adult Height	0.028	−0.027	0.080	0.077	0.089	0.070	0.026	0.122	0.233	−0.035	−0.029	0.260
	(0.25)	(−0.21)	(0.68)	(0.66)	(0.77)	(0.61)	(0.21)	(0.83)	(1.87)	(−0.26)	(−0.21)	(1.50)
Rel Current BMI	−0.190	−0.204	−0.201	−0.200	−0.126	−0.119	−0.139	−0.172	−0.099	−0.193	−0.185	−0.091
	(−9.02)	(−9.07)	(−9.14)	(−9.00)	(−5.89)	(−5.59)	(−6.42)	(−7.98)	(−4.65)	(−8.62)	(−8.67)	(−3.34)
Rel Teen BMI	0.079	0.060	0.093	0.089	0.062	0.058	0.019	0.016	−0.024	0.059	0.045	0.010
	(2.04)	(1.44)	(2.59)	(2.49)	(1.90)	(1.81)	(0.50)	(0.44)	(−0.70)	(1.40)	(1.09)	(0.27)
Age × 100			0.004	0.004	0.005	0.005						−0.006
			(1.13)	(1.12)	(1.55)	(1.58)						(−1.65)
Age^2 × 100			−0.000	−0.000	−0.000	−0.000						−0.000
			(−1.01)	(−1.03)	(−0.90)	(−0.99)						(−0.59)
Male Dummy			0.016	0.015	0.010	0.004						0.004
			(3.47)	(3.22)	(2.11)	(0.74)						(0.63)
Single Dummy			−0.108	−0.107	−0.084	−0.082						−0.075
			(−21.37)	(−21.01)	(−16.77)	(−16.31)						(−11.84)
Income				0.019		0.127						0.097
				(1.96)		(5.23)						(4.04)
Education					0.134	0.126						0.043
					(8.33)	(8.04)						(3.86)
White Dummy					0.094	0.091						0.027
					(14.16)	(14.26)						(3.08)
Income^2						−0.005						−0.003
						(−3.56)						(−3.10)
Risk Aversion						−0.010						−0.009
						(−3.20)						(−2.05)
Mother College Grad							0.087					0.048
							(6.79)					(3.38)
Father College Grad							0.116					0.028
							(7.78)					(2.22)
Mother Professional							0.006					−0.004
							(0.38)					(−0.31)
Father Professional							0.054					−0.013
							(4.01)					(−0.99)
Raised By Both Parents							0.052					0.023
							(8.23)					(2.90)

Table 5. (Continued)

	No controls	No controls	Basic controls	Basic and income controls	Basic and cognitive controls	Basic + Controls	Family background controls	Teenage experience controls	Teenage and aptitude controls	Health controls	Impatience controls	All controls
Indep. var.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Siblings							−0.019					−0.008
							(−11.57)					(−4.26)
No Participation in HS								−0.029	−0.019			−0.021
								(−2.57)	(−1.75)			(−1.82)
Athletic Activites								0.033	0.041			0.035
								(3.88)	(4.64)			(4.00)
Number of HS Activities								0.038	0.007			−0.000
								(11.65)	(2.50)			(−0.03)
Self-Esteem as a Teen								0.008	0.003			0.002
								(5.64)	(2.02)			(1.15)
AFQT Score									0.004			0.003
									(29.46)			(14.18)
Num. of Health Problems										−0.033		−0.016
										(−2.56)		(−1.49)
Mother Alive										0.035		0.002
										(5.01)		(0.20)
Father Alive										0.050		0.002
										(6.99)		(0.32)
Mother Has Health Prob										−0.007		−0.005
										(−1.18)		(−0.81)
Father Has Health Prob										0.015		0.001
										(2.33)		(0.11)
β Impatience											−0.087	−0.051
											(−13.21)	(−6.67)
δ Impatience											−0.020	−0.005
											(−2.69)	(−0.65)
N	18,841	15,614	18,841	18,841	18,841	18,841	15,614	15,614	15,614	15,614	15,614	12,717
Pseudo R^2	0.017	0.017	0.038	0.040	0.078	0.087	0.066	0.061	0.117	0.023	0.027	0.134
[*p*-value: R.T.H.(1) = R.T.H.]		[0.960]	[0.035]	[0.027]	[0.001]	[0.002]						
[*p*-value: R.C.B.(1) = R.C.B.]		[0.882]	[0.017]	[0.032]	[0.000]	[0.000]						
[*p*-value: R.T.H. (2) = R.T.H.]							[0.029]	[0.000]	[0.000]	[0.636]	[0.691]	[0.000]
[*p*-value: R.C.B. (2) = R.C.B.]							[0.000]	[0.025]	[0.000]	[0.091]	[0.004]	[0.000]
[*p*-value: R.T.H. (3) = R.T.H.]				[0.314]	[0.003]	[0.008]						
[*p*-value: R.C.B. (3) = R.C.B.]				[0.075]	[0.000]	[0.000]						

Notes. This table reports the market participation and asset allocation regression estimates using the National Longitudinal Survey of Youth (NLSY) data set. We report the estimates from probit stock market participation regressions. All regressions include year effects. The data are from the 1992, 1993, 1994, 1996, 1998, 2000, 2004, and 2008 waves of the NLSY. All variables are defined in Section C of the online appendix. The z-statistics are reported in parentheses below the coefficient estimates, which are computed using standard errors clustered at the household level. Dependent variable is the market participation dummy. HS, high school; R.T.H., relative teen height; R.C.B., relative current BMI.

results in column (2) are very similar to those in column (1). Specifically, relative teen height and relative current BMI are economically and statistically significant predictors of market participation in both subsamples. Moreover, the relative teen height and relative current BMI coefficient estimates in columns (1) and (2) are statistically indistinguishable, with Wald test p-values of 0.960 and 0.882, respectively.

The baseline result in column (1) continues to hold when we include a set of basic control variables. We add controls for the respondent's age, whether the respondent is male, and whether the respondent is single. In specification (3), relative teen height continues to be positively related to market participation decisions, with a point estimate of 0.547 (z-statistic = 4.98). Furthermore, the relative adult height measure remains statistically insignificant. Relative to column (1), the relative teen height coefficient in column (3) decreases by 0.097, and the decrease is statistically significant (p-value = 0.035). In contrast, the basic set of controls does not explain much of the effect of relative current BMI, changing the magnitude of the coefficient from −0.190 in column (1) to −0.201. However, this difference is statistically significant, with a Wald test p-value of 0.017.

As in our previous tests using the SHARE, DHS, and HRS data sets, we incrementally add controls for income, education, and whether the respondent is white to assess the degree to which these variables reduce the association between height and participation decisions. In column (4), we add income to the basic set of controls and find that it does not have incremental explanatory power relative to that of the basic controls in column (3). This suggests that the relationship between relative teen height and market participation is not driven by the known relationship between teen height and adult income documented by Persico et al. (2004). It also suggests that the income channel does not drive the relationship between current BMI and portfolio decisions.

Next, we add controls for education and whether the respondent is white to the basic set of controls. In column (5), we find that both of the controls for education and race are highly significant determinants of the market participation decision. Furthermore, we find that including these two control variables has an important impact on the relationship of both teen height and current BMI with market participation. Specifically, we find that relative to column (3), the relative teen height coefficient in column (5) decreases by 0.150, and the decrease is statistically significant (p-value = 0.003). In addition, we find that the relative current BMI coefficient decreases in magnitude by 0.075, and that this change is also statistically significant (p-value = 0.000). One interpretation of this result is that education and race may reflect cognitive skills that affect market participation.[18]

Finally, in column (6) we include the entire set of control variables considered in columns (3) to (5), as well as squared income and risk aversion controls. We find that even in the presence of all of these standard controls, relative teen height and relative current BMI remain statistically and economically significant determinants of market participation decisions. This suggests that these relationships are likely to reflect the effects of additional channels.

Overall, the regression estimates obtained using the NLSY data are similar to the baseline estimates obtained using the SHARE, DHS, and HRS data sets (see Tables 2 and 3). The NLSY results provide the additional insight that the correlation between height and portfolio choice is driven by teen height. Next, we use the richness of the NLSY data to examine additional potential channels through which physical attributes may affect portfolio decisions.[19]

4.2. Explaining the Relation Between Teen Height and Portfolio Decisions

4.2.1. Effects of Family Background and Teenage Experiences. If relative teen height is what matters for the relation between height and portfolio decisions, then the channels driving this effect must be correlated with teen height. This observation leads us to examine how experiences during early childhood and teenage years influence the portfolio decisions of taller individuals. Specifically, we consider a set of variables that capture an individual's aptitude, family background, and experiences during teenage years. We follow the Persico et al. (2004) approach and incrementally introduce these variables in the regression specifications and examine whether their inclusion affects the coefficient estimate of teen height relative to that in specification (2).

This analysis is partially motivated by the evidence in previous studies that demonstrates that the positive attributes associated with height can be traced to positive adolescent experiences (e.g., Persico et al. 2004) and even positive early childhood experiences (Case and Paxson 2008b, Case et al. 2009). In particular, taller children get better nutrition and grow up in a healthier overall environment, and they receive positive reinforcements through social interactions throughout their childhood and teenage years. In high school, taller children participate in more social activities, and the social skills acquired during those years have a positive effect on their income levels much later in life. The benefits of height even extend to old age, as taller individuals enjoy better physical and mental health when they are old (Case and Paxson 2008a).

When we add family background variables to the regression specification, we find that the coefficient estimate of relative teen height decreases from 0.671

in column (2) to 0.459 in column (7). Interestingly, the addition of family background controls significantly decreases the magnitude of the coefficient estimate of relative current BMI from −0.204 to −0.139. Furthermore, both of these decreases in magnitude are statistically significant, with Wald test p-values of 0.029 and 0.000, respectively. Among the family background variables, the strongest estimates are for the parental education and the family environment variables, as captured by the number of siblings and whether the respondent was raised by both parents. This finding suggests that while growing up in a more nurturing family environment is important for portfolio decisions, it is unlikely to fully explain the effect of relative teen height.

Next, we examine the relation between relative teen height and variables that capture teenage experiences. This set includes self-esteem during teenage years and variables that capture social experiences during high school years, measured by participation in various high school activities. We find that the coefficient estimate of relative teen height decreases from 0.671 in column (2) to 0.302 in column (8) when we consider teenage experience variables. This difference is statistically significant, with a Wald test p-value of 0.000. This finding is consistent with the evidence in the study by Persico et al. (2004), who demonstrate that taller individuals have higher labor income because of more positive social experiences during teenage years. Taller individuals are more likely to participate in high school activities, and they also receive more positive reinforcements during their teenage years, which lead to higher self-esteem.

Collectively, the market participation regression estimates using extended specifications indicate that the relative teen height coefficient estimate captures the positive effects of teenage personal experiences. This evidence is consistent with our conjecture that the environmental feedback associated with observed physical attributes shapes the unique personal experiences of individuals and affects their portfolio decisions.

4.2.2. Combining Teenage Experiences and Genetics.

Though teenage experiences explain a significant proportion of relative teen height's effect on portfolio decisions, some of the relation may still reflect the influence of genetic factors. For example, Cesarini et al. (2010) and Barnea et al. (2010) demonstrate that up to one-third of the cross-sectional variation in portfolio composition is driven by genetic factors, with the remainder due to experiences. Barnea et al. (2010) also find that the effect associated with family environment is short-lived and cannot explain the genetic component of portfolio variation. This finding echoes our result that family environment does not appear to explain the effect of relative teen height, suggesting that a component of the teen height effect may be driven by a genetic factor.

Accounting for genetics is difficult, since genetic information is not available in the NLSY. Our approach is to jointly estimate the effect of experiences and genetics by introducing controls for each respondent's teenage experiences and their aptitude score on the AFQT. This approach is motivated by Neal and Johnson (1996) and Hansen et al. (2004), who demonstrate that AFQT scores are a function of intellectual endowments and developmental experiences. Therefore, by including teenage experience and AFQT score controls in our regression, we interpret any drop in the effect of relative teen height as being driven by a combination of developmental experiences and genetics.

When we jointly introduce both teenage experience controls and AFQT scores in the regression specification, the effect of relative teen height on market participation is explained entirely, with a statistically insignificant coefficient of −0.112 (z-statistic = −0.81; see column (9)). This represents a significant decrease from both the relative teen height coefficient estimate of 0.671 in column (2) (p-value = 0.000) and of 0.302 with just teenage experience controls in column (8) (p-value = 0.000). Importantly, both the teenage experience controls (e.g., participation in high school activities and athletics) and the AFQT score are important drivers of participation decisions in specification (9). This evidence suggests that the effect of relative teen height is mediated through a combination of teenage experiences and genetics.[20]

4.3. Explaining the Relation Between BMI and Portfolio Decisions

We have established that the effect of relative teen height on portfolio decisions is likely to be mediated through a combination of teenage experiences and latent genetic factors (e.g., IQ). We now consider potential channels that might explain the relation between BMI and portfolio decisions.

Examining the relative current BMI coefficients in columns (7) to (9) of Table 5 reveals that family background and genetic factors can explain some of the association between BMI and portfolio decisions. Furthermore, we find that among the standard controls, almost all of the explanatory power is captured by education and race (see column (5)). One interpretation of this result is that education and race may reflect cognitive skills that affect portfolio decisions. The significant decrease in the magnitude of the relative current BMI coefficient between columns (8) and (9), with a Wald test p-value of 0.000, provides support for this cognitive channel.

4.3.1. BMI and Health Status. Next, we consider two additional channels through which obese individuals may choose to take less financial risk: health risk and impatience. Our approach is partially motivated by Guthrie and Sokolowsky (2017), who show a link between obesity and credit risk, and demonstrate that this link is partially driven by health risk among the obese. Furthermore, Rosen and Wu (2003) show that households reporting poor health allocate less of their financial portfolios to risky assets.

To account for the effects of health, we include a control variable that measures the number of health problems reported by each individual. Because the risk of future health problems may affect participation decisions, we also consider whether the respondent's mother and father are experiencing health problems and whether they are still alive. The regression estimates in specification (10) of Table 5 indicate that the health controls are indeed important determinants of market participation decisions. For example, the participation decisions are negatively related to the number of health problems, with a point estimate of −0.033 (z-statistic = −2.56). Furthermore, parental death is associated with significantly lower participation rates.

Despite the strong effects associated with these health measures, the effect of relative current BMI on portfolio decisions cannot be explained by health factors alone. Specifically, the health controls in specification (10) of Table 5 lead to a relative current BMI point estimate that differs from that in specification (2) by only 0.011.

4.3.2. BMI and Impatience. Another potential explanation of the relation between BMI and financial risk taking is that obese individuals' lower stock market participation may be driven by time preferences. Courtemanche et al. (2015) demonstrate that measures of impatience and BMI are strongly positively correlated among NLSY respondents. Furthermore, they show that this relation is driven by impatient individuals' choices to consume cheaper foods, leading to large weight gains and obesity. If portfolio choices are governed by similar preferences, then obese individuals' avoidance of stocks may be channeled through impatience.

We follow the approach of Courtemanche et al. (2015) and model time preferences using responses to hypothetical survey questions about the time value of money. Specifically, the NLSY asks respondents to consider a prize of $1,000 payable immediately, and to indicate the smallest amount of money they would have to be offered in addition to the $1,000 to convince them to wait for one month to receive the prize. The respondents are then asked to indicate the smallest amount of money to convince them to wait one year. Using responses to these two questions, we model an individual's t-period discount factor as $\beta\delta^t$, where δ represents the long-term discount factor, and β captures the disproportionate weight assigned to immediate outcomes (e.g., Laibson 1997). Using the joint responses to the two survey questions, we calculate β and δ for each individual.[21] For ease of interpretation, we then translate these measures into discount rates, which we term β-impatience and δ-impatience.

The regression estimates in specification (11) of Table 5 show that both impatience measures have a strong negative association with market participation decisions. In particular, β-impatient individuals, those who exhibit strong inconsistency in their time preferences, are especially unlikely to invest in stocks. However, the impatience measures do not appear to explain the relation between BMI and market participation. The relative current BMI point estimate in specification (11) of −0.185 differs from that in specification (2) by just 0.019.

Overall, these findings suggest that the relation between BMI and portfolio decisions is partially channeled through cognitive skills and is not driven by greater health risk and impatience among the obese. Additionally, our results suggest that a combination of teenage experiences and genetic endowments can explain the link between height and financial risk taking.

More generally, the NLSY results provide additional support for our main conjecture and illustrate that the effects of observed physical attributes on financial decisions are statistically and economically significant. We obtain several new insights using these data. First, we demonstrate that the results obtained using the HRS sample that consists of older individuals generalize to the younger U.S. population. Second, we show that the correlation between height and stock market participation is driven by teen height. Third, we show that a combination of teenage experiences, genetics, and cognitive skills are at least three channels through which physical appearance is likely to affect investment decisions.

5. Summary and Conclusions

This study investigates whether observed physical attributes of individuals are associated with their portfolio decisions. The extant evidence from the psychology and economics literatures indicates that height is associated with positive personality factors and positive social experiences, while obesity has opposite correlations. There is a positive premium associated with height and a discount associated with obesity. The main goal of the current study is to investigate whether the impact of physical attributes such as height and BMI extends to portfolio decisions.

Motivated by the evidence from the recent psychology literature, we posit that relatively taller individuals will take greater financial risks, while relatively overweight people will favor less risky investment choices.

We use two large European data sets and two data sets from the United States to examine the effects of both observed and unobserved personality attributes associated with height and BMI.

Consistent with our conjecture, we find that individuals who are relatively taller and of normal weight compared to their peers are more likely to participate in financial markets. Furthermore, the relation between height and stock market participation is driven by relative height as a teenager. Teenage experiences and genetic factors that are fixed at birth are two channels through which height affects financial decisions, while the link between BMI and financial portfolios can be partially explained by lower cognitive skills among the obese. Overall, using multiple data sets from the United States and Europe, we show that observed physical attributes are associated with people's participation in financial markets.

Our evidence of a strong relation between observed physical attributes and portfolio decisions may generalize to other settings. For example, the risk-taking behavior of mutual fund managers, hedge fund managers, and corporate managers could be correlated with their height and body mass index. Because height is correlated with several positive personality attributes, it is likely that managers' performance levels would be related to their height. In a similar manner, the body mass index of managers can be easily observed and could be a good predictor of their risk attitudes and performance.

In recent research, Graham et al. (2013) already demonstrate that physical characteristics of managers influence corporate policies. Specifically, taller chief executive officers (CEOs) are more likely to be associated with high growth firms, perhaps because taller individuals are more confident and less risk averse. Similarly, Graham et al. (2017) show that CEOs' physical appearance affects their level of compensation, where more competent-looking CEOs enjoy an earnings premium. With more extensive data on physical attributes from other economic settings, the relation between personal physical attributes and managerial decisions could be explored further.

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Endnotes

[1] BMI is defined as (weight/height squared) × 10,000, where weight is measured in kilogram and height is measured in centimeters.

[2] In Section B in the online appendix, we provide a detailed overview of studies that link observable physical attributes to decision making.

[3] These results are specific to the SHARE and HRS data since the DHS does not include sociability measures.

[4] This approach is motivated by Neal and Johnson (1996) and Hansen et al. (2004), who demonstrate that AFQT scores are a function of intellectual endowments and developmental experiences.

[5] We make the education variable consistent across the three data sets by using a dummy variable that takes a value of one if the respondent is a college graduate. Similarly, income is an index that ranks respondents within their respective countries using the within-country income measures. The income index is defined as the actual income minus minimum income in the country divided by the difference between the maximum and minimum income estimates for the country.

[6] Hong et al. (2004) find a similar stock market participation rate of 26.7% in their sample of HRS respondents. This rate is lower than in other U.S. data sets for a number of reasons. First, the stock market participation rates in the HRS pertain only to non-retirement-account assets. Second, the HRS focuses on individuals over the age of 50, and there is evidence that older households participate in the stock market to a significantly lesser degree than those who are below 50 (e.g., Ameriks and Zeldes 2004).

[7] The evidence from height studies suggests that extreme height has a negative effect on an individual's personality. For example, Deaton and Arora (2009) find that the tallest do not feel that they have the "best possible" lives. Harper (2000) finds that the probability of being married is lower for the tallest women, indicating that they may have difficulty in finding a suitable match.

[8] Data limitations prevent us from assigning a causal interpretation to the various channels. Instead, our goal is to account for the association between physical attributes and portfolio decisions by grouping control variables into meaningful channels.

[9] We do not consider country fixed effects in specifications that use data from one country and do not use year fixed effects when the decision variable is available for only one year.

[10] We also consider specifications conditional on participation. Unfortunately, focusing on market participants cuts our sample size to a degree that our statistical tests lack sufficient power.

[11] We also report the estimated correlations between relative height and BMI with the control variables grouped into various channels in Table IA.IV in the online appendix.

[12] For brevity, we present only the relevant coefficient estimates for height and BMI regressors in Table 3. Coefficient estimates for all regressors are presented in Table IA.V in the online appendix.

[13] We thank Dan Silverman for sharing the NLSY data used in Persico et al. (2004) with us. We extended their NLSY sample to include data from more recent years.

[14] In untabulated specifications, we also estimate Tobit asset allocation regressions. The results of these specifications echo those of the probit market participation regressions.

[15] Because we use two measures of relative height in the NLSY tests, we suppress the squared height terms for ease of interpretation. We report results including squared teen height in Table IA.VI in the online appendix. The results including squared adult height are almost identical.

[16] In untabulated robustness checks, we verify that our conclusions are unchanged if we do not impose this sample restriction.

[17] Importantly, we find evidence of variation in teenage growth in our sample. Specifically, we find that the change in height between 1981

and 1985 has a sample standard deviation of 1.18 inches, and that the changes in height at the 75th, 90th, 95th, and 99th percentiles of the sample distribution are 1, 2, 3, and 6 inches, respectively.

[18] We further examine the cognitive channel in our discussion of column (9).

[19] We also report estimated correlations between the relative height and BMI measures with the control variables grouped into various channels in Table IA.VII in the online appendix.

[20] The relative adult height coefficient also becomes marginally significant when we include both teenage experience controls and AFQT scores in the regression. This might be because adult height captures a residual effect that we cannot control for. For example, there is evidence that taller adult males tend to be more successful in the marriage market (Harper 2000). Such success might make taller males more overconfident and optimistic, inducing them to participate more in the stock market.

[21] See Courtemanche et al. (2015) for details of this calculation.

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