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Does personality predict financial risk tolerance of pre-retiree baby boomers?

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ABSTRACT

Financial risk tolerance is an important concept that helps financial planners recommend financial products to their clients. As the baby boomer generation approaches retirement, research to determine how these individuals perceive financial risk tolerance has grown exponentially. The present study examines the relationship between financial risk tolerance and the Big Five personality traits (also known as the Five-Factor Model), which include extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience, in the baby boomer generation. We argue that the influences of Big-five personality traits are consistent in baby-boomer generation. We find that baby boomers with a higher degree of extraversion, emotional stability, and openness to experience are more risk tolerant, while those with a higher degree of agreeableness and conscientiousness have lower risk tolerance.

1. Introduction

Financial risk tolerance is an important concept that helps financial planners recommend financial products to their clients. It also has many practical significances in common money matters. For example, a client's financial risk tolerance not only helps their financial planner determine the appropriate risk and return parameters of their investment portfolio but also gives that client a sense of how much planning they generally prefer. Grable and Joo (2004) noted that risk tolerance can best be thought of as a person's willingness to take part in a behavior in which one or more outcomes are both uncertain and potentially negative.

As risk tolerance may be more a characteristic of an individual than of a situation, various psychological, demographic, and economic characteristics of individuals have been investigated as possible determinants of financial risk tolerance. Chitra and Ramya Sreedevi (2011) found that personality traits had an impact on choice of investment method and that the impact of the personality traits was stronger than that of demographic variables. Grable and Joo (2004) suggested that measures of personality among other variables should continue to be included in further investigations into financial risk tolerance. Since a nationally-representative survey, the National Longitudinal Survey of Youth 1979 (NLSY79), added a measure of personality via the Big-Five personality traits in their 2014 wave, we find it prudent to engage this new data in the ongoing investigation of risk tolerance.

The NLSY79 is representative of American children born between 1957 and 1964 living in the US in 1979, so all of its respondents belong to the baby boomer generation. Baby boomers are defined as individuals born between 1946 and 1964, and the overall generation can be split into the three cohorts of "Leading Boomers" born between 1946 and 1950, "Core Boomers" born between 1951 and 1959, and "Trailing Boomers" born between 1960 and 1964 (Wellner, 2000). As the baby boomer generation approaches retirement, research to determine how these individuals perceive risk has grown exponentially. Only 17% of boomers reported that they were currently very optimistic about their own financial future (Ameriprise, 2012). Research specific to the baby boomer generation is in demand by financial planners and counselors, who often have many boomers among their clients and are thus tasked with preparing their finances for retirement. Since the baby boomer generation exhibits ostensible differences from other generations with respect to attitudes and behaviors, it is important to test whether research findings from other samples also apply to the baby boomers.

In this study, we used NLSY79 data to weigh in on previous findings about the Big-Five personality traits to contribute to the

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financial industry's understanding of personality-driven risk attitude, especially with respect to the baby boomer generation. The relationships between risk tolerance and personality traits such as locus of control (Wong and Carducci, 2016), sensation seeking (Wong and Carducci, 2016), and the personality dimensions of extraversion, conscientiousness, agreeableness, emotional stability, and openness (Wong and Carducci, 2013) have been established. However, these studies were based on students from a public university in the Midwestern region of the country whose average age was 23.9 (Wong and Carducci, 2016) and 25.2 (Wong and Carducci, 2013). The primary purpose of the present study is to further explore the findings of Wong and Carducci (2016) using a nationally representative dataset of the baby boomer generation. We would like to determine if the findings of Wong and Carducci are unique to the sample used (i.e. millennials) or also apply to a generation on the other end of the human life cycle, the baby boomers. If the same relationships apply to these disparate generations, we argue that they are consistent across many ages (especially for ages between the millennials and baby boomers, Generation X).

Understanding the financial risk tolerance exhibited by the baby boomer generation can be useful for financial planning practitioners in designing investment portfolios and choosing other financial products (e.g. insurance policies) for this generation. This understanding can also assist financial counselors in developing recommendations to improve the financial well-being of baby boomers as they transition to retirement. Since it is a core component of the financial planning process, financial risk tolerance has been a longstanding topic of research that continues to see high demand from practitioners. We explored several significant relationships between financial risk tolerance and the Big-Five personality traits using the NLSY79 dataset, which led us to a better understanding of subjective risk tolerance in financial planning clients.

2. Literature review

In the last few decades, professionals in the fields of finance, psychology, and economics became increasingly interested in finding the determinants of financial risk tolerance. Financial risk tolerance was thought of as the level of discomfort that an individual was willing to accept when making financial decisions where negative outcomes were possible. In an efficient market, investors could expect a higher return for taking a higher level of risk, so an investor's financial risk tolerance influenced the rate of return they realized on their invested assets. For example, Heo et al. (2018) showed that investments in the stock market were strongly associated with the risk attitudes and preferences of market participants. Understanding financial risk tolerance also helped individuals decide how much risk to take in everyday financial decisions, such as purchasing various insurances policies, having health insurance, getting a new credit card, having an emergency fund, etc. At the societal level, the investment behavior of individuals had a direct effect on the performance of the stock market and thus the world economy.

The reductionist model of risk-taking was the predominant theory behind research on the association between personality and risk-taking behavior. This model sought to identify an underlying cause of risk-taking. The behavior of persons who persistently searched for highly stimulating experiences was attributed to low arousability, also described as low cortical or autonomic responsiveness. More specifically, this low arousability was due to a low level of activation of a behavioral inhibition system and was experienced as a relatively low level of anticipatory anxiety (Levenson, 1990). According to this model, a person engaging in a risky behavior sought to increase their unusually low arousal to a pleasurable level. To achieve a pleasurable arousal level, such an individual sought stimulation that may seem risky and dangerous to the ordinary person. On the other hand, Irwin (1993) presented a model of risk-taking attitudes and behaviors that classified the predisposing factors that influence risk-tolerance attitudes into two categories: environmental and biopsychosocial factors. Examples of environmental factors included socioeconomic status, family situation, and social transitions. Examples of biopsychosocial factors included age, gender, birth order, ethnicity, and personality traits.

Many researchers examined the relationships between demographic variables and financial risk tolerance, for example, gender (Bajtelsmit et al., 1999; Fisher and Yao, 2017), age (Hallahan et al., 2003), education level (Grable, 2000), income and wealth levels (Grable and Joo, 2004), marital status (Roszkowski et al., 1993), and culture (Misra et al., 2019; Pyles et al., 2016). A substantial body of other research indicated that the tendency to take risk was associated with personality, for example, Type A personality (Carducci and Wong, 1998), Myers–Briggs Type Indicator (Filbeck et al., 2005), self-control (Strömbäck et al., 2017), and risk propensity in different domains such as sex, addictions, or participation in outdoor activities (Chauvin et al., 2007; Nicholson et al., 2005).

Since the 1980s, personality had frequently been operationalized using the Big-Five personality traits, also known as the Five-Factor Model. Of the many personality classifications proposed over the years by psychologists, the Big-Five was repeatedly evidenced in wide-ranging data sets from different cultures, with different methods (e.g., self-rating vs. peer-rating) and various instruments (e.g., adjective list or description of behaviors) (Chauvin et al., 2007). The five bipolar factors of the Big-Five personality traits were extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience. Extraversion indicates where an individual's energy was primarily directed—at the extraversion pole an individual focused on the outer world of events and actions, while at the introversion pole an individual focuses on the inner world of thoughts and ideas (Chauvin et al., 2007). Agreeableness included being cooperative, forgiving and trusting. Conscientiousness encompassed being achievement-oriented and hard-working. The factor of emotional stability was equally referred to by its opposite pole, neuroticism; whereas emotional stability was related to self-confidence, optimism, and the ability to deal with stress, neuroticism indicated being frequently worried or nervous (Brown and Taylor, 2011). Finally, openness to experience described individuals who perceived the world with imagination, intellect, and curiosity (Chauvin et al., 2007). Each factor summarized multiple personality facets, and the majority of personality traits used in psychology was mapped onto at least one of the Big-Five (Almlund et al., 2011). The Big-Five was also ideal for research since it was stable over time for working-age adults; although there was evidence that the Big-Five measures can change over the life cycle, the changes were modest and tended to be in young or very old individuals (Cobb-Clark and Schurer, 2012).

Despite these positive attributes of the Big-Five, results of studies relating the Big-Five to risk tolerance was not entirely consistent. Multiple researchers had started with the same general hypothesis that extraversion and openness to experience had positive relationships with risk tolerance while neuroticism (the opposite of emotional stability), agreeableness, and conscientiousness have negative relationships (Chauvin et al., 2007; Donnelly et al., 2012; Nicholson et al., 2005). In theory, extraversion seemed to have the clearest indications of proneness to risk-taking, as its facets (developed by Costa and McCrae in 1985) consisted of warmth, gregariousness, assertiveness, activity, excitement seeking, and positive emotions. Extroverts could be expected to view risky behaviors more leniently than did

introverts, especially since by definition extroverts spent less time "reflecting" than "doing" (Chauvin et al., 2007). Openness to experience might also be logically related to increased risk tolerance since these individuals were accepting of new ideas and adventures (Chauvin et al., 2007).

For the three factors that logically would be related to low financial risk tolerance, neuroticism (low emotional stability) seemed to be most plausible. As neuroticism is a lack of ability to deal with stressful situations, these individuals should evaluate hazards as riskier. Next, conscientiousness was comprised of the facets of competence, order, dutifulness, achievement-striving, self-discipline, and deliberation (cautiousness), which were clearly at odds with the idea of deviance (Chauvin et al., 2007). Conscientiousness was shown to be the most important of the five factors in predicting positive money management behavior (Donnelly et al., 2012), which might relate well to risk tolerance. The same study also found a significant relationship between agreeableness and money management—since agreeableness related to doing what is "right" or "good", one would expect these individuals to be warier of taking large financial risks.

The British team Nicholson et al. (2005) asked over 2000 participants how frequently they engaged in certain risky behaviors within six domains, one of which was the finance domain. They found that the Big-Five factors explained 34% of the variation within the finance domain, with all five being statistically significant (Nicholson et al., 2005). Chauvin et al. (2007) also came close to the logical hypotheses when they compared personality with risk perceptions for a broad range of hazards. Although the relationships varied per hazard, in general, they found extraversion and openness to be associated with lower levels of perceived risks (i.e. higher risk tolerance), and agreeableness and conscientiousness to be associated with higher levels of perceived risks (i.e. lower risk tolerance). They found a negative relationship between emotional stability and risk perception. While none of the hazards considered by Chauvin et al. had to do with financial risks, the findings of Nicholson et al. that risk-taking in one of their six domains were generally associated with risk-taking in the others lends credence that the results of Chauvin et al. could be generalizable to the financial realm (Nicholson et al., 2005).

The most recent study directly relating the Big-Five to financial risk tolerance (and the study that the present paper seeks to extend) was performed by Wong and Carducci in 2013. They surveyed undergraduate students at a Midwestern university and found positive relationships for extraversion and openness, negative relationships for conscientiousness and agreeableness, and no significant relationship for neuroticism. Although no relationship was found between neuroticism and financial risk tolerance overall, they did find that risk tolerance was more sensitive to changes in emotional stability for females than for males (Wong and Carducci, 2013).

The present study examined the relationship between financial risk tolerance and the Big-Five personality traits of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience in the baby boomer generation. Based on our current theoretical understanding, five questions were of central interest:

(1) Do baby boomers with higher extraversion have higher financial risk tolerance?
(2) Do baby boomers with higher openness to experience have higher financial risk tolerance?
(3) Do baby boomers with higher agreeableness have lower financial risk tolerance?
(4) Do baby boomers with higher conscientiousness have lower financial risk tolerance?
(5) Do baby boomers with higher emotional stability have higher financial risk tolerance?

3. Methods and model

3.1. Dataset

The present study used data from the National Longitudinal Survey of Youth 1979 (NLSY79) that covered a nationally representative sample of American youth born between 1957 and 1964 (ages 54–61 in 2019). The interviews were performed by the Bureau of Labor Statistics annually from 1979 to 1994 and biennially after 1994. We only used the 2014 wave in the present study, as it was the only wave that measured both risk tolerance and the Big-Five personality traits. As we limited our sample to only baby boomers in the NLSY79 cross-sectional sample, the total sample size in the present study was 4447. We divided this sample into two categories, core boomers (born between 1957 and 1959) and trailing boomers (born between 1960 and 1964), following Wellner (2000) and the U.S. Census Bureau. In this sample, there were no respondents from the leading baby boomer cohort. Gilliam et al. (2010) reported that trailing boomers were found to exhibit significantly higher risk tolerance than core boomers when controlling for demographic and economic variables. In our sample, financial risk tolerance levels between each cohort of the overall baby boomer population were significantly different, so we analyzed models for both boomer cohorts available in our dataset separately.

3.2. Dependent variable

In this study, financial risk tolerance was the dependent variable. Respondents were asked to evaluate their degree of risk tolerance in financial matters and rate themselves from 0 to 10, where 0 means "unwilling to take any risks" and 10 means "fully prepared to take risks". A factor complicating the interpretation of previous findings in the literature was that every research team used a different method of measuring risk tolerance depending on the data available to them. For example, Fisher and Yao (2017) used the traditional risk tolerance question from the Survey of Consumer Finances (SCF), Hallahan et al. (2003) used the proprietary ProQuest Personal Financial Profiling system, and several teams created their own risk tolerance scores (typically using Likert-type questions). In this study, we used the simple 0 to 10 financial risk tolerance measure included in the NLSY79 because it is most likely to coincide with risk tolerance measures used in future studies. Notably, the most widely used dataset in household finance research, the SCF, added a question in its 2016 wave that assesses financial risk tolerance on a scale from 0 to 10. We acknowledge that one question subjective risk tolerance questions have inherent weaknesses (for example, lack of multidimensionality) and may not be a perfect measure of risk tolerance, however, many researchers had provided evidence that this type of measure might be reasonable (Grable and Lytton, 2001; Gilliam and Grable, 2010). Continued use was further based on the assumption that the results from the item could be compared across research studies that use single-item subjective risk tolerance measures.

The NLSY79 also included the Barsky et al. (1997) income-gamble sequence of questions that might be another candidate for our dependent variable. This is actually a measure of risk aversion not risk tolerance. Moreover, researchers have demonstrated several problems associated with this measure. For example, Hanna et al. (2001) expressed three criticisms. The first criticism was related to taxes—the hypothetical questions used in Barsky et al. (1997) were ambiguous with regards to gross income versus after tax income. This could create a substantial bias both at the lower end of the income scale, where respondents might perceive a high effective marginal tax rate in terms of loss of benefits, and at

the upper end of the income scale, where the combined marginal tax rate might approach 50%. The second criticism was related to Barsky et al.'s failure to provide distinctions between levels of relative risk aversion above 3.8. The Barsky measure estimated four levels of risk aversion, but the most risk averse level was equivalent to a relative risk aversion level of 3.8 or higher, even though it might be useful to know different levels of risk aversion above that level. The third criticism was based on ambiguity about what alternatives the respondent would have if they chose a 50–50 chance and the worse alternative resulted. For instance, if someone chose the gamble and their income were cut by a third, would their income be forever cut by a third? It seems plausible that this alternative was not imagined by many respondents, especially by younger respondents, but in order for the Barsky et al. measure to reflect relative risk aversion, it is essential that respondents consider income drops to be permanent. In addition, Kapteyn and Teppa (2002) showed that the Barsky et al. (1997) measure has little explanatory power, whereas subjective measures did a considerably better job. The Barsky et al. measure had a nice direct interpretation if individuals had constant relative risk aversion (CRRA) preferences. Kapteyn and Teppa (2002) found the risk tolerance measure of Barsky et al. did a poor job of explaining choices between risky and less risky assets. Other, simpler risk attitudes measures did have a significant effect on the choice of risky assets. It thus appears that these simple attitude measures provide better measures of risk tolerance.

There are a few different possible explanations for the empirical weakness of the Barsky et al. income-gamble sequence of questions. First, the questions were somewhat complicated and many respondents might have a hard time understanding the exact meaning of the questions. Secondly, the questions were conditioned on a respondent's current situation. For instance, a risk tolerant individual with a risky portfolio may be induced to choose a safe income stream, since they are already exposed to considerable risk. Conversely, a risk averse individual with a very safe portfolio can afford to choose a riskier income path. In both cases the observed relationship between the measured risk tolerance and portfolio choice is attenuated.

3.3. Independent variables

The Big-Five personality traits of extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience were measured through responses to the Ten-Item Personality Inventory (TIPI). The TIPI displayed adequate levels of convergent and discriminant validity, test–retest reliability, and patterns of external correlates (Gosling et al., 2003). Ehrhart et al. (2009) found that the TIPI items generally loaded strongly on their respective factors in an ethnically diverse sample. Each of the five factors measured by the TIPI is scored on a 7-point scale ranging from 1 (disagree strongly) to 7 (agree strongly) (Gosling et al., 2003).

We used demographic variables such as gender, age, race, marital status, education, employment status, and income as control variables since these variables were known to be related to risk tolerance (Fonseca et al., 2012; Hirschl et al., 2003; Ho et al., 1994; Yao et al., 2005). Specifically, people were divided into three categories based on marital status, including married, unmarried and others (i.e. separate, divorced, and widowed). Some economic characteristics such as income, employment status, and business ownership were also included in the analysis (see Table 1). Income was used in a logarithmic form for ease of interpretation. An increase in income of one dollar might have no effect on high-income people, and a one percentage point increase in income is more meaningful for people with various income levels. People were asked about their employment status including working, unemployed, retired and homemaker. The unemployed status includes temporarily laid off, unemployed and looking for work, and disabled and unable to work.

3.4. Data analysis

We started our analysis with descriptive statistics of the variables used in the study. We also did group comparisons of risk tolerance, and TIPI constructs by baby boomer types, regions, gender, marital status, race, education, employment, and having business status. For bivariate groups we used two-tailed t-tests, and for the multi-variate groups we used analysis of variance (ANOVA). The results from these tests do not control for other variables, but they do provide groundwork for further analysis using regressions with control variables.

The dataset was analyzed using an ordinary least squares (OLS) regression model, even though the dependent variable, financial risk tolerance, was measured on an ordinal scale. Williams (2016) suggested that an ordinal scale dependent variable could be treated as a continuous variable when the dependent variable has five or more categories. In our case, the dependent variable had 11 levels.

To examine factors associated with risk tolerance, we adopted six models. There was a pair of models for the overall boomer sample, a pair for the core boomers, and a pair for the trailing boomers. Each pair of models included one model without the personality variables and one with all variables including the Big-Five variables. To test our five hypotheses that examine how Big-Five personality traits are associated with risk tolerance for the overall sample, core sample, and trailing sample, we used models 2, 4, and 6 respectively. Our main model specification was as follows:

$$Y_i = \beta_0 + \beta_{1j} D_{Boomer} + \beta_2 logI_i + \beta_3 Age_i + \beta_{4j} D_{Edu} + \beta_{5j} D_{Gender} + \beta_{6j} D_{Race} + \beta_{7j} D_{ES} + \beta_{8j} D_{MS} + \beta_{9j} D_{HB} + \beta_{10} EX_i + \beta_{11} AGR_i + \beta_{12} CON_i + \beta_{13} ES_i + \beta_{14} OE_i + \mu_i$$

where Y is the outcome variable of interest, *i.e.* financial risk-tolerance scores; D_{Boomer} is the dummy variable for baby boomer categories where core baby boomer is the reference group; I is income of the respondent; Age is age of the respondent; D_{Edu} is the dummy variable for education where high school or below is the reference group; D_{Gender} is the dummy variable for gender where male is the reference group; D_{Race} is the dummy variables for the racial categories where White is the reference group; D_{ES} are the dummy variables for the employment status where working is the reference group; D_{MS} is the dummy variable for marital status where never married is the reference group; D_{HB} are the dummy variables for having business where having no business is the reference group; EX is a respondent's extraversion score; AGR is a respondent's agreeableness score; CON is a respondent's conscientious score; ES is a respondent's emotional stability score; OE is a respondent's Openness to Experience score; and μ_i is the error term.

Postestimation Wald tests were conducted to examine if coefficients for Big-Five personality traits of core boomers were significantly different from those of trailing boomers. In addition, each model was tested for the presence of multicollinearity using Variance Inflation Factor (VIF).

4. Results

4.1. Descriptive analysis

Descriptive analysis of demographic variables for the total sample of baby boomers and subsamples of core and trailing baby boomers is presented in Table 1. The sample was composed of 26% core boomers and 74% trailing boomers. Overall, demographic composition of the core and trailing baby boomer samples was very similar, except for the age variable. The difference in age was not surprising as core and trailing baby boomers

Table 1
Descriptive statistics for demographic characteristics.

Name	Levels	Full sample N = 4447	Core boomers N = 1156	Trailing boomers N = 3291
Baby boomers	Core boomers	26%		
	Trailing boomers	74%		
Age		52.64 (2.24)	55.50 (0.50)	51.75 (1.64)
Gender	Male	51%	50%	51%
	Female	49%	50%	49%
Education	High school or below	50%	49%	50%
	College	50%	51%	50%
Race	White	83%	83%	83%
	Black	14%	14%	14%
	Other	3%	3%	3%
Marital status	Never married	12%	10%	12%
	Married	61%	63%	60%
	Other	27%	27%	28%
Employment status	Working	81%	79%	81%
	Unemployed	14%	14%	14%
	Retired	2%	4%	2%
	Homemaker	3%	3%	3%
Region	Northeast	16%	17%	16%
	North Central	28%	28%	28%
	South	38%	37%	38%
	West	18%	18%	18%
Log(Income)		10.63 (1.10)	10.52 (1.11)	10.51 (1.10)
Having business	No	83%	83%	82%
	Yes	17%	17%	18%

Note: Standard deviations are in parenthesis. "Other" in marital status denotes people who are separated, divorced or widowed. "Other" category in race includes those persons who were Japanese, Chinese, Vietnamese, Asian Indian, Native American, Korean, Eskimo, Pacific Islander, or of another race besides black or white.

Table 2
Comparison of sample means with Wong and Carducci (2013).

	Current study		Wong and Carducci (2013)	
	Mean	Std. Dev.	Mean	Std. Dev.
Risk tolerance	4.83	2.73	4.5	0.9
Extraversion	4.51	1.46	5.8	1.3
Agreeableness	5.21	1.23	7.0	1.1
Conscientiousness	5.73	1.27	7.0	1.2
Emotional stability	5.08	1.36	5.6	1.3
Openness to experience	4.94	1.27	6.6	1.1

Note: N = 4447.

were from two different age cohorts. The sample is 51% male and 49% female. Half of the sample was college educated. The sample was predominantly white, married, working (the sample had very few retirees), and from the Midwest and South. Most of the sample did not own any business.

Table 2 presents the means and standard deviations of risk tolerance and Big-Five personality scores for the overall baby boomer sample. Mean and standard deviations from Wong and Carducci (2013) are provided for comparison. The values from Wong and Carducci were based on college student population (mean age 25.2). The mean risk tolerance score for baby boomers was higher than what was reported by Wong and Carducci. Means for Big-Five personality traits of baby boomers are lower than what were reported by Wong and Carducci.

The core boomer and trailing boomer cohorts did not have significantly different risk tolerance (see Table 3). As for the scores in the Big-Five characteristics (also in Table 3), trailing boomers had significantly higher extraversion and lower agreeableness ($M = 4.46$ and $M = 5.18$ respectively) than core boomers ($M = 4.32$ and $M = 5.24$ respectively). Conscientiousness, emotional stability, and openness to experience did not vary significantly between core and trailing boomers.

Tables 3–5 also show the risk tolerance and Big-Five personality scores for different demographic groups. Risk tolerance did not vary significantly among the race categories. There was no overall significant difference in risk tolerance, agreeableness, and conscientiousness among the different regions. However, significant differences in extraversion, emotional stability, and openness to experience were detected among the four regions, which was likely due to the cultural influence on personality traits. Males were significantly more risk tolerant ($M = 5.19$) than females ($M = 4.53$). Males scored significantly lower in extraversion ($M = 4.33$) and agreeableness ($M = 4.92$), but higher in emotional stability ($M = 5.16$) than females ($M = 4.52$, $M = 5.44$, and $M = 5.04$ respectively). Risk tolerance did not vary significantly among different marital status categories. However, all Big-Five personality traits varied significantly. Married boomers scored the highest in all personality trait categories. There were significant racial differences in risk tolerance. White boomers scored lower than black and the other racial category. There were significant differences in extraversion and openness to experience among the racial categories. No significant difference among racial categories was detected for the agreeableness, conscientiousness, or emotional stability variables.

Respondents with at least one year of college ($M = 5.07$) indicated significantly higher risk tolerance than those with education levels of high school or below ($M = 4.62$). The two education levels had significant differences for all five personality traits—respondents with at least one year of college scored higher in extraversion ($M = 4.62$), agreeableness ($M = 5.32$), conscientiousness ($M = 5.83$), emotional stability ($M = 5.30$), and openness ($M = 5.10$) than respondents with less education ($M = 4.26$, $M = 5.08$, $M = 5.64$, $M = 4.93$, and $M = 4.84$). Risk tolerance did not vary significantly among the four employment status categories. However, there were significant differences in Big-Five personality traits by employment status. Respondents who had business were significantly more risk tolerant ($M = 5.84$) than those who did not have a business ($M = 4.67$). Respondents who had business scored significantly higher on extraversion ($M = 4.67$), conscientiousness ($M = 5.81$), emotional

Table 3
Means and standard deviation for baby boomers and regional categories.

Levels	Baby boomers		T- statistic	Regions				F- statistic
	Core	Trailing		Northeast	North Central	South	West	
Risk tolerance	4.79 (2.97)	4.86 (2.95)	−0.87	4.81 (2.97)	4.76 (2.68)	4.78 (3.07)	4.98 (2.94)	1.77
Extraversion	4.32 (1.44)	4.46 (1.46)	−3.27***	4.43 (1.46)	4.43 (1.43)	4.38 (1.47)	4.55 (1.43)	4.05***
Agreeableness	5.24 (1.28)	5.18 (1.27)	1.74*	5.19 (1.27)	5.22 (1.25)	5.2 (1.31)	5.14 (1.21)	0.99
Conscientiousness	5.71 (1.31)	5.73 (1.32)	−0.35	5.68 (1.31)	5.73 (1.26)	5.77 (1.36)	5.68 (1.28)	1.78
Emotional stability	5.05 (1.36)	5.11 (1.39)	−1.60	4.99 (1.36)	5.06 (1.35)	5.15 (1.42)	5.09 (1.35)	3.61**
Openness to experience	4.97 (1.32)	4.95 (1.32)	0.34	5.05 (1.32)	4.88 (1.25)	4.96 (1.36)	4.97 (1.27)	3.57**

Note: N = 4447. Standard deviations are in parentheses. *, **, and *** indicate significance at an alpha level of 0.1, 0.05, or 0.01 respectively.

Table 4
Means and standard deviation for Gender, Marital status, and Racial categories.

Levels	Gender		T- statistics	Marital status			F- statistic	Race			F-statistic
	Male	Female		Never married	Married	Other		White	Black	Other	
Risk tolerance	5.19 (2.98)	4.53 (2.90)	−5.36***	4.86 (3.19)	4.81 (2.76)	4.83 (3.13)	0.13	4.78 (2.70)	4.91 (3.28)	5.01 (3.29)	2.37*
Extraversion	4.33 (1.39)	4.52 (1.51)	−17.06***	4.14 (1.42)	4.54 (1.43)	4.38 (1.49)	31.95***	4.56 (1.47)	4.2 (1.42)	4.24 (1.31)	43.79***
Agreeableness	4.92 (1.23)	5.44 (1.27)	−1.10***	5.09 (1.33)	5.22 (1.23)	5.19 (1.33)	4.32**	5.19 (1.22)	5.2 (1.39)	5.09 (1.22)	1.31
Conscientiousness	5.71 (1.32)	5.74 (1.32)	3.47	5.54 (1.46)	5.82 (1.21)	5.66 (1.40)	22.36***	5.72 (1.24)	5.73 (1.44)	5.75 (1.31)	0.11
Emotional stability	5.16 (1.35)	5.04 (1.42)	1.48***	4.96 (1.47)	5.2 (1.30)	4.98 (1.47)	23.1***	5.07 (1.33)	5.15 (1.47)	5.12 (1.39)	2.08
Openness to experience	4.98 (1.30)	4.93 (1.33)	9.83	4.88 (1.40)	4.98 (1.23)	4.95 (1.32)	2.76*	4.92 (1.24)	5.02 (1.43)	4.93 (1.39)	3.58**

Note: N = 4447. Standard deviations are in parenthesis. *, **, and *** indicate significance at an alpha level of 0.1, 0.05, or 0.01 respectively. "Other" in the Marital Status variable denotes people who are separated, divorced or widowed. "Other" category in Race variable includes those persons who were Japanese, Chinese, Vietnamese, Asian Indian, Native American, Korean, Eskimo, Pacific Islander, or of another race besides black or white.

stability ($M = 5.27$), and openness ($M = 5.14$) than respondents who did not have business ($M = 4.39$, $M = 5.71$, $M = 5.07$, and $M = 4.93$).

4.2. Ordinary least square regression results

To test our five hypotheses, we examined six regression models. Table 6 shows the results of these regression models and the level of significance according to t-statistics. To examine if the TIPI variables can explain the difference in risk tolerance between the core and trailing baby boomers, we compared two models. In one model (Model 1) we omitted the TIPI variables and in another (Model 2) we included those variables. Model 1 results showed that there was a significant difference between the risk tolerance of core and trailing baby boomers. Trailing baby boomers' risk tolerance was significantly lower than that of core baby boomers. However, this difference disappeared in Model 2 when we included the TIPI variables. These results showed how the individual differences in personality could explain the difference in financial risk tolerance of baby boomers.

The regression results suggested that extraversion, emotional stability, and openness to experience were positively associated with risk tolerance while agreeableness and conscientiousness were negatively associated with risk tolerance for baby boomers in general. These results support all five hypotheses. Trailing boomers were similar to boomers in general—higher extraversion, emotional stability, and openness to experience and lower agreeableness and conscientiousness were associated with increased risk tolerance. However, core boomers with higher extraversion and openness to experience and lower agreeableness and emotional stability would be expected to be significantly more risk tolerant than otherwise. For the core boomers, the effect of conscientiousness was not statistically significant (Model 4). Results from the postestimation Wald tests showed that coefficients for extraversion, agreeableness, conscientiousness, and openness to experience were not significantly different from those of trailing boomers. However, the coefficient for emotional stability of core boomers was significantly different from that of trailing boomers.

Gender and race also significantly affected risk tolerance. Female baby boomers were significantly less willing to take risks than males in all models, with the size of the effect ranging from −0.53 to −0.71. The coefficient for females was the second largest in the comprehensive model, behind only the effect of having a business. The results for race were less universal. For boomers overall, blacks were significantly more risk tolerant than whites. This significance carried over to the trailing boomer cohort, but not to the core boomers. Race was also a significant variable for respondents of other races, but only in the trailing boomer cohort. In those regressions (Models 5 and 6), respondents of other races had higher risk tolerance scores than the white reference group, and the coefficients were larger in magnitude than those for the black group.

Each of our remaining independent variables also had some degree of significance in the regression models. More highly

Table 5
Means and standard deviation for Education, Employment, and Business categories.

Levels	Education		T-statistic	Employment status				F-statistic	Having Business		T-statistic
	High school or below	College		Working	Un-employed	Retired	Home-maker		No	Yes	
Risk tolerance	4.62 (3.22)	5.07 (2.56)	−6.22***	4.88 (2.77)	4.85 (3.37)	5.08 (2.97)	4.66 (3.08)	0.56	4.67 (2.96)	5.84 (2.73)	−12.44***
Extraversion	4.26 (1.45)	4.62 (1.44)	−10.17***	4.51 (1.43)	4.16 (1.50)	4.54 (1.55)	4.55 (1.54)	16.44***	4.39 (1.45)	4.67 (1.47)	−5.60***
Agreeableness	5.08 (1.33)	5.32 (1.19)	−7.39***	5.22 (1.22)	5.06 (1.37)	5.24 (1.04)	5.36 (1.42)	5.54***	5.19 (1.29)	5.18 (1.21)	0.15
Conscientiousness	5.64 (1.41)	5.83 (1.19)	−5.95***	5.83 (1.22)	5.44 (1.48)	5.92 (1.10)	5.62 (1.40)	27.13***	5.71 (1.33)	5.81 (1.25)	−2.27**
Emotional stability	4.93 (1.46)	5.3 (1.27)	−10.76***	5.25 (1.29)	4.73 (1.55)	5.14 (1.30)	5.11 (1.42)	41.19***	5.07 (1.39)	5.27 (1.36)	−4.16***
Openness to experience	4.84 (1.37)	5.10 (1.23)	−8.41***	5.02 (1.27)	4.84 (1.41)	5.08 (1.24)	4.78 (1.42)	6.78***	4.93 (1.32)	5.14 (1.31)	−4.62***

Note: N = 4447. Standard deviations are in parentheses. *, **, and *** indicate significance at an alpha level of 0.1, 0.05, or 0.01 respectively.

Table 6
Ordinary least square regression for risk tolerance.

Risk tolerance	Overall		Core boomer		Trailing boomer	
	Model 1 $\beta^{\#}$	Model 2 $\beta^{\#}$	Model 3 $\beta^{\#}$	Model 4 $\beta^{\#}$	Model 5 $\beta^{\#}$	Model 6 $\beta^{\#}$
Intercept	6.98***	5.19***	17.03*	13.97	6.64***	4.61***
Boomer (Ref: = Core boomer)						
Trailing boomer	−0.23*	−0.17				
Log (Income)	0.11***	0.09**	0.18**	0.13	0.08*	0.07
Age	−0.06**	−0.04	−0.25	−0.19	−0.05*	−0.03
Education (Ref: = High school or below)						
College	0.45***	0.37***	0.59***	0.58***	0.40***	0.31***
Gender (Ref: = Male)						
Female	−0.68***	−0.64***	−0.53***	−0.53***	−0.71***	−0.67***
Race (Ref: = White)						
Black	0.29***	0.29***	0.35	0.31	0.27**	0.25*
Other	0.28	0.29	−0.3	−0.26	0.47*	0.47*
Employment status (Ref: = Working)						
Unemployed	0.39**	0.34**	0.33	0.18	0.40**	0.40**
Retired	−0.06	−0.02	0.36	0.53	−0.5	−0.53
Homemaker	0.39	0.28	−0.85	−0.88	0.71	0.6
Marital status (Ref: = Never married)						
Married	−0.35***	−0.42***	−0.60*	−0.66**	−0.27*	−0.33**
Other	−0.18	−0.27*	−0.23	−0.27	−0.16	−0.26*
Having Business (Ref: = No business)	0.98***	0.88***	0.87***	0.84***	1.03***	0.89***
Extraversion		0.20***		0.23***		0.20***
Agreeableness		−0.17***		−0.19***		−0.16***
Conscientiousness		−0.14***		−0.04		−0.17***
Emotional stability		0.07***		−0.19***		0.15***
Openness to experience		0.30***		0.32***		0.29***
Observation	4447	4298	934	893	3513	3405
Pseudo R^2	0.05	0.10	0.06	0.11	0.05	0.10

Notes: *, **, and *** indicate significance at an alpha level of 0.1, 0.05, or 0.01 respectively. # Coefficients are standardized. "Other" in the Marital Status variable denotes people who are separated, divorced or widowed. "Other" in the Race variable denotes. "Other" category in Race variable includes those persons who were Japanese, Chinese, Vietnamese, Asian Indian, Native American, Korean, Eskimo, Pacific Islander, or of another race besides black or white.

educated baby boomers were more risk tolerant according to all six models. Age had only a small and typically insignificant effect on risk tolerance, as respondents to the NLSY79 were from the same generation. Model 2 using the overall baby boomer sample indicated that a baby boomer with higher the income was more risk tolerant. However, the association did not hold in models 4 and 6 when we ran models separately for core and trailing baby boomers and included TIPI variables in both models. Based on Models 1, 2, 5, and 6, baby boomers who were unemployed had higher risk tolerance than working respondents but being unemployed was not associated with core boomers' risk tolerance. Married baby boomers had significantly lower risk tolerance than those who were never married according to all models, although the effect was stronger for core boomers than for trailing boomers. Lastly, baby boomers who own businesses have significantly higher risk tolerance than those who did not own businesses. This relationship was consistently the largest in the magnitude of all the significant effects in each regression.

In addition, as shown in Table 7, the average variance inflation factor (VIF) for each of the six models was less than 2.0, suggesting a low likelihood of presence of multicollinearity among the variables.

Table 7
Multicollinearity test scores for six models.

	VIF
Model 1: Full sample with Big-Five traits	1.46
Model 2: Full sample without Big-Five traits	1.54
Model 3: Full sample with Big-Five traits	1.42
Model 4: Full sample without Big-Five traits	1.43
Model 5: Full sample with Big-Five traits	1.31
Model 6: Full sample without Big-Five traits	1.35

5. Discussion

The present study extends the research of Wong and Carducci (2013), in which the authors examined university students' risk tolerance, to the baby boomer generation. We used the large-scale nationally representative NLSY79 data instead of primary survey data from a college community. Our study indicates that the Big-Five personality traits have significant influences on risk tolerance. Baby boomers with a higher degree of extraversion, emotional stability, and openness to experience are more risk tolerant, while those with a higher degree of agreeableness and conscientiousness have lower risk tolerance. These results are consistent to a large extent with the paper of Wong and Carducci (2013), except that their study did not find any association between emotional stability and risk tolerance. Our findings provides additional evidence to the argument that the influences of Big-five personality traits are almost consistent in different generations.

Additionally, our results support the general hypotheses on all five personality traits. As discussed in the literature review, many previous teams studying the Big-Five's relationship with risk tolerance hypothesized that extraversion, openness to experience, and emotional stability are positively related to risk tolerance while agreeableness and conscientiousness are negatively related to it, but most of those teams did not obtain results that supported all five relationships. In both our comprehensive model (Model 2) and the trailing boomers' full model (Model 6), each of the five relationships predicted by our study's explicit hypotheses was upheld and significant.

More precise elements of our findings for the Big-Five personality traits are also consistent with the prior literature. The relatively larger coefficients for extraversion (0.20 in the full model) and openness to experience (0.30 in the full model) compared to the other three Big-Five traits are not surprising, given how many previous studies agreed with those two relationships (for example, Nicholson et al., 2005; Chauvin et al., 2007; Wong and Carducci, 2013; Brown and Taylor, 2011). The inconsistent direction of the relationship between risk tolerance and emotional stability (positive for Model 2, negative for Model 4, and positive for Model 6) is unusual, but not entirely surprising since the literature is not in agreement about this personality trait (Nicholson et al. and Chauvin et al. found it to be positive, Chitra and Ramya Sreedevi (2011) found it to be negative, and other teams obtained insignificant results). Our finding may actually signal why those previous studies could not agree on the effect of emotional stability on risk tolerance—we now know that the birth cohort of each study's sample can completely change the direction of the relationship. The only unexplained result for the Big-Five variables is the lack of significance for conscientiousness in core boomers (coefficient of −.04) compared to trailing boomers (0.17) and the overall sample (0.14). According to Table 3, mean conscientiousness levels are very close for core and trailing boomers, so controlling for one or more other variables seems to have erased the effect of conscientiousness on risk tolerance for the core boomer cohort, but not for the younger trailing boomer cohort.

A major departure between our findings and previous studies concerns the explanation for the difference in risk tolerance between the core boomer and trailing boomer cohorts. Gilliam et al. (2010) determined that trailing boomers have significantly higher risk tolerance than core boomers, but our Model 1 shows the reverse. Through their proprietary dataset, Gilliam et al. tested nearly the same set of demographic and economic variables as our Model 1 did. However, when we introduce the five personality variables through our Model 2, the difference in risk tolerance between the two cohorts disappears—the coefficient was no longer significant. This distinction between our two models succinctly demonstrates the important role of personality in any comprehensive model of risk tolerance. The Gilliam et al. study suffered from omitted variable bias, resulting in an illusory difference in risk tolerance levels between the core and trailing cohorts.

5.1. Implications

The applications for practitioners are substantial. As the TIPI is extremely quick to administer while still accurately assessing the Big-Five traits, financial planners and financial counselors can include the TIPI in the set of questionnaires that are initially given to new clients with minimal impact to the length of the information gathering process. Furthermore, since the Big-Five traits are stable over time for adults, it is not necessary to re-administer the TIPI regularly until a client reaches very old age or undergoes other experiences that may change their core personality (although the best practice would still be to administer the TIPI during each client's annual review).

Planners and counselors may already know about the usefulness of assessing client personality traits for building stronger relationships and providing tailored experiences, but our study indicates there is a supplemental benefit to having a client's Big-Five profile—these five traits are strong indicators of risk tolerance and thus play a potentially large role in many financial behaviors and decisions. Risk tolerance is one of the two major factors that determine a client's asset allocation for the investment portfolio (the other factor being time horizon). The asset allocation, in turn, limits the magnitude of the potential gain or loss in a portfolio, which affects an individual or family's financial stability, wealth accumulation, and pattern of consumption during both their working life and their retirement. Investors with low risk tolerance (perhaps indicated by their high agreeableness and/or high conscientiousness) should be encouraged to accept slightly more risk so that they can realize enough gain to fund their goals, while investors with high risk tolerance (perhaps indicated by their high degrees of extraversion, openness to experience, and/or emotional stability) should be cautioned about the potential negative consequences of taking on too much investment risk. Risk tolerance also indicates what level of insurance protection a client would prefer, so clients with particularly low risk tolerances should be offered very comprehensive insurance portfolios. On the other hand, clients with particularly high risk tolerances should be counseled to purchase more insurance than they may feel is necessary. On the whole, knowing a client's risk tolerance is useful for both aiding clients in achieving their wealth goals and protecting clients with particularly low or high risk tolerance from their own tendencies.

As it is a financial planner or financial counselor's duty to promote and protect their clients' economic well-being, they should pay careful attention to the risk tolerance of their clients. Risk tolerance questionnaires are notoriously variable in accuracy and precision, so having another assessment of risk tolerance by way of the Big-Five should help practitioners verify and supplement the results of their practice's risk tolerance questionnaire. Research on financial risk tolerance and personality traits supports

the well-being of individuals, the outcomes of professionals, and in a grand sense the smooth functioning of the economy. It is our hope that the present study provides valuable insights for all participants in the financial world.

5.2. Limitations

Major limitations to our study arise due to our dataset, the 2014 round of the National Longitudinal Survey of Youth 1979. One element of the NLSY79's survey design that greatly impacted the scope of our study was the age cohort. While the NLSY79 fit the broad purpose of our study since it surveys a large number of individuals in the baby boomer generation, the sample covers only the trailing boomer cohort and some birth years of the core boomer cohort. The entirety of the leading boomer cohort (born from 1946 to 1950) and the earlier part of the core boomer cohort (through 1956) were excluded by the survey. This prevented us from running regressions limited to the leading boomer population, which would have allowed further comparisons between our models and those of Gilliam et al. (2010). Generational differences due to economic and socio-political experiences of the leading and trailing boomers may include significant divergence in the average personality profiles of each cohort, whereas we were only able to see significant differences between the extraversion and agreeableness scores of the core and trailing boomers.

Another aspect of the NLSY79 2014 dataset creates our second limitation: unequal sample sizes. The choice of birth years for the survey's cohort generates an inequality between the number of years belonging to the core boomer segment (three, 1957 to 1959) and to the trailing segment (five, 1960 to 1964). As a result, our sample sizes for the two core boomer models (Models 3 and 4) are smaller than for the other four models. The difference in the number of observations may explain the lack of significance in race and employment status for the core boomer models since the trailing and overall models had significant results. Although we have included the variables that have theoretical support from literature, there is still a possibility that our models suffer from omitted variable bias. For future research, we recommend using a panel dataset.

Notwithstanding these limitations, the results of the present study are considerable. We confirm that the Big-Five traits of extraversion, emotional stability, and openness to experience have positive relationships with risk tolerance and that agreeableness and conscientiousness have negative relationships with risk tolerance. Due to our use of the NLSY79, we know that these relationships can be extended from the Midwestern university student population to the United States core and trailing baby boomer populations. Furthermore, since the NLSY79 2014 wave survey used the short TIPI questions to assess the Big-Five traits, the relationships between the Big-Five and risk tolerance can be rapidly applied by financial planning and counseling practitioners through the inclusion of the TIPI in their information gathering process. Overall, our study reaffirms the power of individual behavioral difference in financial decision-making and the significance of personality in driving risk attitudes.

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Erratum

Erratum regarding missing Declaration of Competing Interest statements in previously published articles

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Declaration of Competing Interest statements were not included in the published version of the following articles that appeared in previous issues of "Journal of Behavioral and Experimental Finance".
The appropriate Declaration/Competing Interest statements, provided by the Authors, are included below.

(1) "Simulation-based learning using the RIT market simulator and RIT decision cases" [Journal of Behavioral and Experimental Finance, 2019; 23C: 12-22] https://doi.org/10.1016/j.jbef.2019.05.003.

Declaration of competing interest: The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: The RIT simulation-based learning software referred to in the article was invented and developed by the authors who have a financial interest to support on-going development.

(2) "Cross-border transactions, mergers and the inconsistency of international reference points" [Journal of Behavioral and Experimental Finance, 2019; 22C: 14-21] https://doi.org/10.1016/j.jbef.2019.01.001.

Declaration of competing interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

(3) "Does personality predict financial risk tolerance of pre-retiree baby boomers?" [Journal of Behavioral and Experimental Finance, 2019; 23C: 124-132] https://doi.org/10.1016/j.jbef.2019.06.001.

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(4) "The disposition effect, performance, stop loss orders and education" [Journal of Behavioral and Experimental Finance, 2019; 24C: 100240] https://doi.org/10.1016/j.jbef.2019.100240.

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(5) "Is all politics local? Regional political risk in Russia and the panel of stock returns" [Journal of Behavioral and Experimental Finance, 2018; 21C: 70-82] https://doi.org/10.1016/j.jbef.2018.11.002.

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Declaration of competing interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

(7) "Application of situational stimuli for examining the effectiveness of financial education: A behavioral finance perspective" [Journal of Behavioral and Experimental Finance, 2018; 17C: 68-75] https://doi.org/10.1016/j.jbef.2017.12.009.

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