The Intertemporal Persistence of Risk Tolerance Scores

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Executive Summary

- Using a unique international panel dataset, this paper documents the persistence of risk tolerance test scores over time.
- Initial risk tolerance test scores, derived from a valid and reliable test questionnaire, explained more than 60 percent of retest scores.
- Other significant variables associated with retest risk tolerance scores were gender, age, and year of retest. Specifically, women's scores were found to be lower at the retest. Older respondents exhibited lower risk tolerance scores at the retest, and compared to those who retested in 2014–2015, scores were lower when retested in 2011, 2012, and 2013.
- An important caveat to the findings is that the effect size of gender, age, and year of retest was quite small. Essentially, initial test scores explained nearly all of the variance in retest scores.

How persistent is financial risk tolerance across time? This is a question financial planners often ask after watching some of their clients alter financial plans in response to increased trading volatility and external macroeconomic shocks (Kitces 2012). It is conceivable, for example, that risk tolerance is neither stable nor persistent. Maybe a client's financial risk tolerance is quite variable and dependent on market conditions, changes in the economy, and alterations in household financial circumstances. It may also be the case that what financial planners sometimes sense as a change in risk tolerance that results in odd financial planning behavior is something entirely different. It is possible that other client-specific factors are varying while risk tolerance remains relatively stable. As designed, one anticipated outcome from this study was to test which of these possibilities was more likely.

Before moving forward, it is important to clearly define what is meant by the term financial risk tolerance. The International Organization for Standardization (2006) concluded that financial risk tolerance is the extent to which someone is willing to experience a less favorable outcome in the pursuit of an outcome with more favorable attributes. The key word in the definition is willingness (Grable 2000), which is someone's degree of readiness to engage in behavior. Other concepts are sometimes used interchangeably to describe a person's willingness to engage in financial behavior in which the outcomes are potentially negative. Examples include risk perception, risk preference, and risk need. It is worth noting, however, that these terms are not synonymous with risk tolerance.

According to Nobre and Grable (2015), risk perception, for instance, is a person's subjective evaluation of the riskiness inherent in a decision outcome. Risk preference is a person's general feeling that one decision choice is superior to another. Risk need is a

proxy term for the amount of risk someone must accept in order to achieve a particular financial goal. When financial planners see client behaviors change over time, it may be a variation in one of these or other factors that is driving the change, rather than a significant modification in risk tolerance.

When viewed with these definitional frameworks in mind, the answer to why clients sometimes alter their financial plans becomes much more nuanced. This was documented by Gerrans, Faff, and Hartnett (2015). They studied changes in financial risk tolerance between 2007 and 2009 controlling for numerous variables, including locational, demographic, and market factors. They concluded that risk tolerance tended to be relatively stable over time, being only gradually reshaped over extended periods of time. If true, this prompts other related questions; namely, if client behavior varies but risk tolerance is stable over short periods, is it possible that risk tolerance becomes less persistent over time? Additionally, if risk tolerance is both stable and persistent, but behavior varies, what is the value of measuring financial risk tolerance in the first place? Beyond the simple reply that financial regulators require risk attitude assessment, a more practical answer is that a person's willingness to engage in a risky financial behavior is an important element in explaining and predicting behavior.

Although it is true that factors such as risk perception, risk preference, risk capacity, and risk need all help shape behavior, financial risk tolerance plays an overly important role in shaping actual behavior (Nobre and Grable 2015). Few people ultimately engage in behavior unless they are willing to take the risks involved. Thus, it is still important for financial planners to measure financial risk tolerance.

Nearly all financial planning models that incorporate financial risk tolerance assume that risk tolerance is stable and persistent. This is a problem if it turns out that risk tolerance vacillates. If risk tolerance does change in a predictable manner, then financial planners can take steps to monitor and adjust plans based on this reality.

This study was undertaken to test the persistence of financial risk tolerance over time as a way to determine how mutable risk attitudes are in practice. The remainder of this paper provides a review of measurement issues, a description of the methodology used to test the persistence of risk tolerance, a presentation of results, and a brief discussion of findings.

Theoretical Considerations

Whether a person's willingness to engage in a risky behavior is a relatively fixed dimension of personality or a transient emotional disposition is a question that has been widely debated in the financial planning literature. Some have argued that people have a natural tendency to perceive situations in a certain way that influences their willingness to take risks. Those who hold this position maintain that risk tolerance is most likely domain and context specific, but in general, people's willingness to engage in a risky behavior is more stable and persistent than volatile.

Others have countered this proposition by showing that people's risk tolerance appears to exhibit greater variability than previously thought. Those holding this position point out that the market environment, macroeconomic variability, and personal tastes and perceptions play important roles in shaping risk attitudes, and as such, someone's willingness to engage in a risky financial behavior. Supporters of this view often note that regardless of the context, risk tolerance will change regularly and quickly based on changes in these types of factors (Pan and Statman 2010). Taken to its furthest extent, those with this viewpoint often argue that attempting to measure someone's financial risk tolerance is at best a hopeful evaluation, and at worst a waste of time (Roth 2013; Yook and Everett 2003).

While this debate continues unabated within the practitioner community—especially among financial planners who develop, manage, and monitor client portfolios—it is worth noting that the general consensus among psychologists and psychometricians is that financial risk tolerance is more aligned with other trait factors than with emotional dispositions (Harlow and Brown 1990).

Dispositional trait theory defines a trait as a habitual emotion, attitude, thought, or behavior exhibited by an individual (Kassin 2003). Emotions, on the other hand, tend to be momentary and directed at a specific target (Gaulin and McBurney 2003). Traits can either be dichotomous in nature (such as exhibiting or not exhibiting something) or dimensional. Consider locus of control as a trait factor. Locus of control ranges from high external to high internal with many degrees of control preference along a spectrum. Additionally, traits can be classified as central, cardinal, or secondary (Allport 1961). A central trait is an element of personality shared across persons. Honesty and fairness are common central traits. A cardinal trait is one that dominates a person's life and behaviors across domains and contexts. Having a strong desire to love and be loved is an example of a cardinal trait. Secondary traits differ from central and cardinal trait factors. Secondary traits are situationally defined and arise only in the context of an appropriate situation or circumstance. Examples include becoming nervous when speaking publically but remaining calm when engaged in individual conversations, and becoming impatient when stuck in traffic but being easygoing at a crowded restaurant.

Although psychologists have not specifically identified financial risk

tolerance as a personality trait, they have isolated more broadly defined risk appraisal factors as personality traits. Examples include openness to experience, harm avoidance, novelty seeking, sensation seeking, and impulsivity. For example, Eysenck and Eysenck's (1977) definition of impulsivity clearly identified risk taking, planning tendencies, and quickness of evaluation as elements of this personality trait. Financial risk tolerance fits well within this context, especially if financial risk tolerance is viewed as a secondary trait described by aspects of impulsivity, sensation seeking, and other related factors.

Even when faced with a theoretical argument, some researchers and financial planning practitioners have pointed to distinct moments in history when apparent risk-tolerance attitudes among investors appeared to change to a degree beyond what dispositional trait theory would predict. Stated another way, trait theory allows for some variability in exhibited thoughts and behaviors, but a core proposition in the theory is that in order for something to be a trait factor the dimension must be relatively stable and persistent.

A number of studies have tested this proposition. The assessment methods used to test the stability and persistence of financial risk tolerance has been quite diverse. According to Roszkowski and Grable (2005), researchers typically use one of five assessment procedures: (1) expert judgments; (2) heuristics; (3) objective measures; (4) single-item questions; or (5) risk scales. Professional judgements tend to be weakly associated with subsequent risky behavior. Heuristics, like equating physical risk taking with financial risk taking, have also been found to be problematic. Objective measures, including determining the ratio of equity assets to fixed-income securities, can sometimes be used to gauge someone's risk appetite; however, objective measures are unable to show why someone made a decision. Single-item measures, while providing a quick evaluation of a person's attitude, lack the ability to assess the multidimensional nature of risk tolerance. Shortcomings with these methods are the primary reason researchers prefer to use risk scales when evaluating someone's willingness to take risk.

Numerous scales are used in practice. Consider the work of Guillemette and Finke (2014). They used the FinaMetrica risk-tolerance scale—a widely used test with documented validity and reliability—to evaluate monthly risk-tolerance scores over the period January 2007 through May 2012. They linked risk tolerance scores with equity market returns to determine whether the market environment influenced risk evaluations. Their findings were perhaps startling. Guillemette and Finke noted a high positive correlation between average monthly S&P 500 stock returns and risk tolerance scores. At face value, their results supported the case of those who believe that risk tolerance, as an attitudinal construct, is a transitory disposition that can be altered by environmental factors. However, this was not, in actuality, the key finding from their study.

Guillemette and Finke (2014) went on to show that over the period studied, the standard deviation of S&P 500 returns was more than 17 percent. During the same time period, the standard deviation of average monthly risk tolerance scores was less than 2 percent. They found similar correlation and standard deviation figures when price-to-earnings ratios and dividend yields were matched to risk tolerance scores. Their core findings provided some evidence for those holding the hypothesis that financial risk tolerance is a trait factor. If financial risk tolerance were simply a transitory disposition, then the level of volatility associated with risk tolerance scores should have been much closer to that of the market. Instead, Guillemette and Finke found that while risk tolerance scores did change, the level of change was quite modest (closer to what psychologists might describe as being relatively stable), not large or transitory. They concluded that "individual risk tolerance scores are determined more by individual preference than external market forces" (p. 44).

While there have been relatively few attempts to evaluate the persistence of risk tolerance over time, many studies have been undertaken to examine the stability of risk tolerance scores across time. Some of these studies have suffered from methodological problems. Experimental inquiries, in particular, have often relied on small participant samples using income or retirement asset choice dilemma questions. A primary concern with some of these studies is their lack of generalizability, particularly to the practice of financial planning. Additionally, psychological studies that frame the question of attitude stability and persistence entirely within trait theory often forgo an analysis of demographic and locational factors as an element of the testing process.

Some researchers follow Eysenck's (1967) model of trait formation by focusing on the interrelationships between the brain and physiological functioning as the primary control variables. Although this line of analysis has been effective in showing that arousal levels, stressors, and stress responses have both direct and mediating effects on personality, findings have rarely provided financial planners with applications for practice. For example, few financial planners have the ability or technological wherewithal to measure psychophysiological outcomes when working with clients. What is needed, from a financial planning perspective, is information about the persistence of risk tolerance controlling for basic demographic characteristics and locational information.

Factors Associated with Financial Risk Tolerance

Through the adherence to governmental policy and good practice, all financial planners gather information about a client's gender, age, education, marital status, household income, household size, and net worth position during the data-gathering stage of the planning process (Grable, Klock, and Lytton 2013). A robust literature shows how these variables are related to risk tolerance test scores, but very little indicates how well these demographic characteristics predict future risk tolerance, or if these characteristics influence the persistence of risk tolerance scores over time.

It is known, for example, that men tend to exhibit higher risk tolerance than women, holding other factors constant. Some have argued that there is a biological explanation for these differences (Ardehali, Paradi, and Asmild 2005; Bajtelsmit, Bernasek, and Jianakoplos 1999; Grable and Roszkowski 2007), whereas others point to socialization factors as the most important explanation for apparent gender differences (Halek and Eisenhauer 2001; Yao and Hanna 2005).

The association between age and financial risk tolerance is complex. For many decades, financial planners used a client's age as a proxy for human capital. It was not uncommon for financial planning textbooks to suggest that financial planners take the age of their client and subtract this from 100. It was then recommended that the result be the amount allocated to risky portfolio assets, such as equities. This was called the Rule of 100. Some financial planners assumed that because the percent allocated to equities, based on the formula, decreases over time that older people are inherently more risk averse. While this may, in fact, be the case, heuristic rules, such as the Rule of 100, provide no evidence that age is related to a person's willingness to take financial risk. It may be that with age comes experience, knowledge, and increased financial capacity. These factors may combine to allow older individuals to be more willing to take on risk (Ardehali et al. 2005; Wang and Hanna 1997). On the other hand, older individuals may change their reference point from being focused entirely on asset accumulation to one that increasingly calls for asset preservation. If this is the case, it would be reasonable to hypothesize that age and risk tolerance are inversely associated.

The literature is relatively clear in documenting a positive association between educational attainment and financial risk tolerance (Ardehali et al. 2005; Halek and Eisenhauer 2001). It is generally thought that advanced education allows an individual to better understand contextual concepts like risk and return, as well as better evaluate perceptions of risk and develop more nuanced risk preferences (Sung and Hanna 1996).

Marital status is another variable that is commonly thought to be related to the formation and adaptation of risk tolerance attitudes. It is interesting to note, however, that the research on this topic is split almost equally between findings showing that singles are more risk tolerant and results indicating that married couples are more risk tolerant. A common argument for the single hypothesis is that non-married individuals are constrained in their decision-making only by endogenous factors (Ardehali et al. 2005; Yao and Hanna 2005). This means that singles may be focused on maximizing their own happiness or utility without considering the impact of losses on others, whereas those who are married must account for their actions from the perspective of the household unit. On the other hand, some researchers have pointed out that being married allows an individual and couple to diversify sources of income and wealth. This household financial diversification then allows married households to take greater risks, which should result in an upward shift in risk tolerance (Hinz, McCarthy, and Turner 1997).

Previous studies have documented a robust positive relationship between household income and financial risk tolerance (Ardehali et al. 2005; Hallahan, Faff, and McKenzie 2004). It is important to note, however, that much of this literature is based on cross-sectional data, which reduces the ability to draw causality conclusions.

The association between household size and financial risk tolerance, similar to marital status, has been mixed. Some have argued that as family size grows, the household head becomes increasingly more risk averse as a way to minimize household wealth volatility (Daly and Wilson 2001; Jianakoplos and Bernasek 1998). Others have pointed out that risk need—or the rate of return required to meet specific future goals—often requires that heads of larger households be willing to take more financial risk (Van de Venter, Michayluk, and Davey 2012). Those who hold this position have hypothesized that given a household's limited income and wealth, the household must be willing to take larger risks as a way to stretch resources to cover a diversity of needs. It is worth noting, however, that there is some evidence to indicate that household size is not statistically associated with risk tolerance (Sung and Hanna 1996).

Similar to the household income and risk tolerance literature, net worth is another factor commonly thought to be positively associated with risk tolerance (Grable and Joo 2004). Because of limitations associated with nearly all previous studies, it is only possible to hypothesize about the causality of the relationship. It is conceivable that net worth, as a measure of risk capacity, might induce greater risk tolerance. It

is also imaginable that those with more wealth have less need to take risk, and as such, they might be more risk averse.

Locational factors may also play a role in shaping the persistence of risk attitudes over time. For example, it is known that the willingness to take financial risk differs by cultural background and economic system (Cole 1998; Fan and Xiao 2006; Gerrans et al. 2015). Grable, Joo, and Park (2010)) noted, for instance, that those living in Asia are more likely to report a lower tolerance for financial risk compared to Americans. They suggested that Hsee and Weber's (1999) cushion hypothesis might explain this result. Essentially, the cushion hypothesis states that for those living in areas where there are robust governmental and familial safety nets, there is less need to worry about future financial losses. Few studies have examined the cushion hypothesis in relative terms across Western societies. One might assume, for example, that those living in a country with large social and financial safety nets, such as Australia, might exhibit higher risk-tolerance attitudes compared to those whose economic safety nets are more constrained, such as those living in the United States. As with most risk tolerance studies, few have attempted to use locational factors as a predictor of risk tolerance test scores.

Purpose of Study

As previously noted, the stability and persistence of financial risk tolerance scores across time continues to be debated within the financial planning profession. Much of the discussion, and resulting disagreements, is the result of inadequate empirical data to support one side of the argument over the other. The debate gets more complicated when factors such as demographic characteristics and locational variables are incorporated into discussions. The primary purpose of this study was to document with empirical evidence whether financial risk tolerance attitudes—when measured with a valid and reliable test—do exhibit a high degree of persistence over time.

This study addressed some of the operational flaws seen in some earlier studies. Nearly all previous studies that tested the degree of variability in risk tolerance scores have been hampered by one methodological flaw; namely, the lack of matching panel data. Previous reports relied on either cross-sectional analyses or longitudinal data (tracking average population risk tolerance scores, rather than individual risk tolerance scores over time). Few studies have been published using initial and retest data from the same person over a period of years (a panel study). This paper advances the financial planning literature by documenting the relative persistence of risk tolerance scores over time using panel data.

The study was based on a unique dataset that tracked initial period risk tolerance and basic demographic characteristics and then matched these data to a retest risk tolerance assessment. The following research questions were tested in this study:

1. Does a risk-tolerance score from a prior period (initial test) predict a risk tolerance score in a later period (retest)?
2. Are basic demographic characteristics measured in a prior period predictive of retest risk tolerance scores?
3. Does the retest year influence retest scores?
4. Does the country of a test taker predict retest scores?
5. What is the overall strength of the relationship between initial test and retest risk tolerance scores controlling for basic demographic characteristics, year of retest, and country of test taker?

Methods

Data were provided by FinaMetrica, a leading international risk-profiling firm. Data represent matched panel longitudinal risk tolerance score responses from 4,066 individuals. Initial data were coded by respondent and date. The data collection process began in 2010 and continued through early 2015. The sample frame was delimited to include only those respondents between the ages of 20 and 80. Data were matched by respondent code when a respondent completed the same risk tolerance questionnaire at a later period.

Given the methodological approach, care was taken to ensure that any recall bias was minimized. Typically, tests taken and retaken within a six-month period often suffer from bias resulting from respondent familiarity with the questions. Research shows, however, that this bias is significantly reduced when the retest occurs one year or later after the initial test (Brusco and Watts 2015; Lurie and Kistner 2011). In this study, the mean number of days between the initial test and retest was almost two years (mean = 807 days; SD = 389 days; and median = 765 days). As such, recall bias was assumed to be minor.

Risk tolerance scores were based on 25 questions asked of individual investors living in Australia, the United Kingdom, and the United States. Examples of questions asked in the survey include the following:

Investments can go up and down in value and experts often say you should be prepared to weather a downturn. By how much could the total value of all your investments go down before you would begin to feel uncomfortable?

a. Any fall in value would make me feel uncomfortable
b. 10 percent
c. 20 percent
d. 30 percent
e. 50 percent
f. More than 50 percent

You are considering placing one-quarter of your investment funds into a single investment. This investment is expected to earn about twice the CD (certificate of deposit) rate. However, unlike a CD, this investment is not protected against loss of the money invested. How low would the chance of loss have to be for you to make the investment?

a. Zero, i.e. no chance of loss
b. Very low chance of loss
c. Moderately low chance of loss
d. 50 percent chance of loss

In recent years, how have your personal investments changed?

a. Always toward lower risk
b. Mostly toward lower risk
c. No changes or changes with no clear direction
d. Mostly toward higher risk
e. Always toward higher risk

When summed, scores could theoretically range from zero to 100, with low scores indicating relative risk aversion and higher scores indicating greater risk tolerance. Given that data from three countries were used in this study, FinaMetrica normed the data using proprietary weights to allow for cross-country comparisons. The reliability of the instrument when measured using Cronbach's alpha was 0.90. This level of reliability provides evidence of the consistency of the test and the high likelihood of producing consistent results across respondents.

The mean and standard deviation scores for the initial test were 47.62 and 9.43, respectively. The range of scores was 14.00 to 93.00. Retest mean and standard deviation scores were 48.27 and 9.67, respectively. Minimum and maximum scores for the post test were 15.00 and 95.00, respectively. The correlation between initial and retest scores was 0.79, which was significant at the $p < 0.001$ level. A paired one-sample t test showed that the difference in scores was statistically significant ($t_{9750} = 492.47$, $p < 0.001$); however, the effect size of the score difference was low.

Table 1: Sample Characteristics and Data Coding

Characteristic	Coding	Percent	Mean	SD
Gender	Male = 1	55%		
	Female = 2	45%		
Age	Interval	N/A	57.53 years	11.27 years
Marital Status	Married = 1	83%		
	Not married = 2	17%		
Education	Did not complete high school = 1	14%		
	Completed high school = 2	12%		
	Trade or diploma qualification = 3	20%		
	University degree or higher = 4	54%		
Household Income	Under $20,000 = 1	2%		
	$20,000 to $49,999 = 2	8%		
	$50,000 to $99,999 = 3	30%		
	$100,000 to $199,999 = 4	34%		
	$200,000 to $499,999 = 5	20%		
	$500,000 or over = 6	7%		
Household Size	Interval	N/A	1.35	1.3
Net Worth	Under $10,000 = 1	1%		
	$10,000 to $24,999 = 2	1%		
	$25,000 to $49,999 = 3	1%		
	$50,000 to $99,999 = 4	2%		
	$100,000 to $199,999 = 5	5%		
	$200,000 to $499,999 = 6	16%		
	$500,000 to $999,999 = 7	34%		
	$1,000,000 to $1,999,999 = 8	23%		
	$2,000,000 to $4,999,999 = 9	12%		
	$5,000,000 or over = 10	5%		

Basic household-level demographic characteristic data were collected as a component of the initial test. Matching data were not available in the retest dataset. Table 1 summarizes the characteristics of the sample. Table 1 also shows how the variables were coded for analysis.

A year-of-retest variable was created for 2011, 2012, and 2013. These variables were developed to account for the possibility that a particular year's market environment might have influenced the retest score. Additionally, these variables were hypothesized to approximate an aging effect in the data to account for the possibility that risk tolerance might change as people age. A 2010 variable was not included because there were no retest takers in 2010. Retests taken in 2014 and 2015 were used as the reference categories.

Finally, a dummy variable for each country represented in the sample was created. The United Kingdom was coded UK = 1, otherwise 0. Similarly, the United States was coded US = 1, otherwise 0. The reference category was Australia, which was coded AU = 1, otherwise 0.

An OLS model was developed to test how gender, age, marital status, education, household income, household size, net worth, and country of respondent predicted initial test scores. The purpose of this analysis was to determine how well these variables worked as a precursor to the intertemporal analysis. A hierarchical ordinary least squares regression method was then used to test the research questions. Initial test scores were added at step 1. The basic demographic characteristics were added together at step 2. The retest years were added at step 3. Locational variables were entered at step 4 to account for

Table 2: OLS Regression Results Showing the Relationship between Initial Risk Tolerance Scores and Demographic and Country Variables (N = 4,066)

Variable	B	SE B	β
Constant	71.57	1.41	
Gender (1 = male; 2 = female)	–5.59	0.27	–0.30***
Age at Initial Test	–0.22	0.01	–0.26***
Education	–1.14	0.70	–0.02
Marital Status (1 = married; otherwise = 0)	–0.11	0.13	–0.01
Household Income	0.15	0.14	0.02
Household Size	–0.05	0.11	–0.01
Net Worth	–0.19	0.10	–0.03
UK	–1.71	0.35	–0.09***
US	0.96	0.44	0.04**

Notes: $R^2 = 0.170$ ***p < 0.001 **p < 0.01 *p < 0.05

possible nationality differences in the sample. An evaluation of collinearity constraints was conducted prior to and during the analysis. Specifically, zero-order correlations between and among the independent variables were evaluated to ensure that associations among the variables were not large. This was followed by a test of VIF and tolerance collinearity statistics. VIF scores for the independent variables ranged from 1.00 to 1.61. All tolerance scores were above 0.85, except household income, which was 0.73, and the UK and US variables, which were 0.62. Based on these scores, it was determined that the model did not suffer from multicollinearity issues.

Results

The first step in the modeling process was focused on documenting the way in which the control variables were related to initial test scores. As shown in Table 2, women were found to exhibit a lower initial score. Older respondents were initially less risk tolerant. Respondents living in the UK exhibited a lower risk tolerance score, whereas those living in the US had higher initial risk tolerance scores. Overall, the model explained approximately 17 percent of the total variance in initial test scores.

The next step in the analysis involved determining the relationship between initial and retest scores. Overall, initial test scores, combined with the demographic characteristics, country of respondent, and yearly variables, explained a significant proportion of variance in retest scores. As shown in Table 3, at step 4, $R^2 = 0.64$ ($F_{13, 4053} = 557.17$, $p < 0.001$).

Before moving forward, it is important to acknowledge that there was a general tendency for retest risk tolerance scores to increase over time; however, the average increase was very modest—less than 1 percent overall—from initial test to retest. This means that although average risk tolerance scores did fluctuate, the level of moderation from one test to another was, in fact, quite small and not particularly meaningful. In other words, the persistence of risk tolerance scores from one period to another was especially noteworthy in this study. The following discussion links the results shown in Table 3 to the specific research questions of interest in this study.

The first question asked whether initial financial risk tolerance test scores can predict retest risk tolerance scores. This was the first test of persistence. Results from this study showed that not only are initial test scores predictive of retest scores, overall, initial test scores were the most important predictor of future scores. This was true at each step in the hierarchical regression. In the final model, $\beta = 0.74$, ($t_{4033} = 72.65$, $p < 0.001$). Someone's initial risk tolerance estimate explained more than 60 percent of the same person's risk tolerance score in a later period, holding other factors constant. This means that financial planners can have a relatively high degree of confidence in the persistence of client risk tolerance over time. The average client's risk tolerance, when measured with a valid and reliable risk assessment test, should not change dramatically over a two- to five-year time period.

The second question asked whether any specific demographic characteristics might predict retest risk tolerance scores, controlling for a person's initial test score and other factors. Initially, at step 2 (see Table 3) three demographic characteristics were found to be significant. However, in the final model, only two variables were meaningful: gender and age at initial test.

Overall, women were significantly more likely to exhibit a lower retest score compared to men. Additionally, retest scores were found to be lower for those who were older at the initial test period. This might be related to a biological downward shift in risk tolerance (Brockett and Golden 2007), or it may be a result of a perception among older individuals that it is important to adopt an asset preservation attitude as one ages. None of the other demographic characteristics were significantly related to retest scores in the model.

The third question asked whether the year in which the retest was completed might influence retest scores. Each of the yearly variables (2011, 2012, and 2013) was found to be negatively associated with retest scores when 2014–2015 was used as the reference category. This means that compared to those who took a retest in 2014–2015, respondents were more likely to exhibit a small downward

shift in risk tolerance. It is possible that specific market conditions or other environmental factors (for example, economic turmoil, geopolitical events, elections, etc.) might have influenced the manner in which people responded to the risk-tolerance assessment.

For example, Australia experienced negative market returns in 2011, whereas returns in 2014 were positive. It is plausible that the yearly results were linked to the general tendency of older individuals to scale back their market expectations over time by becoming more conservative (Jianakoplos and Bernasek 2006). Financial planners should use caution when evaluating the demographic and yearly results however. These variables, when combined at step 3 of the model shown in Table 3, explained approximately 1 percent of retest scores. Even though the variables were statistically significant, the actual effect size of the three variables was very small.

The fourth question asked if the country of the test taker could be used to predict the retest score. Conceptually, it was thought that those living in Australia (AU), the United Kingdom (UK), and the United States (US) might differ in their initial and retest risk attitudes. Possible differences might have arisen based on distinctive economic circumstances, cultural norms, or social safety nets. It turns out, however, that there were no differences among AU, UK, and US respondents in terms of retest scores.

The final question asked to what degree the overall strength of the relationship between initial test and retest risk tolerance scores would be after controlling for demographic characteristics, year of retest, and country of respondent. As shown in the last column of Table 3, the strength of the association between initial test and retest scores was remarkably stable at each step in the model.

Table 3: Hierarchical Regression Results Showing the Relationship between Initial and Retest Risk Tolerance Scores and Other Variables (N = 4,066)

Variable	B	SE B	β
Step 1			
Constant	9.70	0.48	
Initial Test	0.81	0.01	0.79***
Step 2			
Constant	17.64	1.21	
Initial Test	0.76	0.01	0.74***
Gender (1 = male; 2 = female)	–1.37	0.19	–0.07***
Age at Initial Test	–0.08	0.01	–0.10***
Education	0.02	0.09	0.00
Marital Status (1 = married; otherwise = 0)	0.94	0.48	0.02*
Household Income	–0.05	0.10	–0.01
Household Size	0.04	0.08	0.01
Net Worth	0.02	0.07	0.00
Step 3			
Constant	18.16	1.20	
Initial Test	0.76	0.01	0.75***
Gender (1 = male; 2 = female)	–1.35	0.19	–0.07***
Age at Initial Test	–0.08	0.01	–0.10***
Education	0.01	0.09	0.00
Marital Status (1 = married; otherwise = 0)	0.84	0.47	0.02
Household Income	–0.04	0.10	–0.01
Household Size	0.32	0.08	0.00
Net Worth	0.02	0.07	0.00
2011 Retest	–1.76	0.45	–0.04***
2012 Retest	–1.89	0.27	–0.07***
2013 Retest	–0.65	0.22	–0.03**
Step 4			
Constant	18.12	1.22	
Initial Test	0.76	0.01	0.74***
Gender (1 = male; 2 = female)	–1.38	0.19	–0.07***
Age at Initial Test	–0.08	0.01	–0.10***
Education	0.01	0.09	0.00
Marital Status (1 = married; otherwise = 0)	0.84	0.47	0.02
Household Income	–0.04	0.10	–0.01
Household Size	0.03	0.08	0.00
Net Worth	0.02	0.07	0.00
2011 Retest	–1.73	0.45	–0.04***
2012 Retest	–1.90	0.27	–0.07***
2013 Retest	–0.68	0.22	–0.03**
UK	0.11	0.24	0.01
US	0.53	0.30	0.02

Notes: $R^2 = 0.623$ for step 1; $\Delta R^2 = 0.013$ for step 2 ($p < 0.001$); $\Delta R^2 = 0.001$ for step 3 ($p < 0.01$); $\Delta R^2 = 0.000$ for step 4 ($p < .01$). ***$p < 0.001$ **$p < 0.01$ *$p < 0.05$

Initial test scores, controlling for all other factors, explained more than 60 percent of an individual's future test score. In other words, the evidence for persistence of risk tolerance scores was robust. Other important variables for predicting an individual's future test score, in rank order from highest to lowest, were: (1) age at initial test; (2) gender; (3) 2012 retest; (4) 2011 retest; and (5) 2013 retest.

Discussion

The term "persistence" refers to the intertemporal continuity of an effect. The results from this study suggest

clients' financial risk tolerance attitudes, as measured by a valid and reliable test, exhibit some degree of persistence over time. This finding aligns well with similar reports by Gerrans and his associates (2015) and Guillemette and Finke (2014). Findings also provide support for the notion that financial risk tolerance is much more akin to a trait than a passing emotional disposition (Eysenck and Eysenck 1977), and that previous criticisms of risk tolerance tests in general may be overstated.

It is worth noting that risk tolerance scores did fluctuate over the time period evaluated in this study, but changes in risk tolerance scores, on average, were quite modest. For example, the mean pretest score was 47.62, whereas the average retest score was just slightly higher at 48.27. The standard deviation of scores showed even less variability. Even though risk tolerance exhibited persistence, it is worth noting that in some situations retest scores were not predicted well by initial test scores. Within any large sample, it is possible to find retest scores that were significantly higher or lower than initial test scores. This was certainly the case in this study. It is important to note, however, that such changes were most likely driven by factors outside the scope of this study. For instance, it is reasonable to hypothesize that someone's retest score may have fallen because of a change in household status, such as a shift in marital status, loss of income, or decrease in assets. Unfortunately, matching demographic data were not available in the retest dataset to evaluate whether large shifts in risk tolerance scores might have been influenced by these types of factors. Further research is needed to explore this possibility.

Practical Application

Financial planners can use the findings from this study in several ways. First, results do support the notion that a financial planner can assume that a client's risk tolerance attitude will remain relatively steady over time. This knowledge allows a baseline estimate of a client's willingness to engage in a risky financial behavior to be established. Although financial planners should assume some variation over time in their clients' willingness to take financial risk, this should not be an overriding concern given that the average variability in retest scores noted in this study over the five-year time period was relatively small.

Second, and perhaps more importantly, findings highlight the importance financial planners play in adding value to their clients' lives. Sometimes clients engage in problematic behavior or make changes in their financial plans that appear to run counter to their risk tolerance. When this happens, it may be only tangentially related to a reduction in a client's tolerance for risk. Instead, it is more likely that another variable in the client's life has been altered or distorted. Maybe it is the client's perception of risk that has been transformed. Maybe the client's preference for one asset or strategy over another has changed. It is also possible that the client's current or future financial circumstances have been or will be altered, or the client's emotional disposition has weakened or strengthened. These are all factors that financial planners can address during client-planner engagements.

Although it is very difficult to modify a trait, it is much easier to provide guidance, support, and information about the way a client perceives the risk of a situation, product, or choice, the preference they may have for one strategy or another, or the types of solutions that will allow someone to navigate financial turmoil. In other words, financial planners can add value to the client-planner relationship by helping clients remain goal-focused and by aligning advice with a client's risk tolerance.

This study provided direct evidence regarding the persistence of risk tolerance scores, however more research on this topic is needed. For example, future studies could delve into the influence of client life events on changes in risk tolerance. It may be possible, for example, that events such as divorce, job loss, or personal or business bankruptcy shift a person's willingness to take financial risks.

Another avenue of study involves the measurement of changes in risk tolerance. Specifically, it would be useful to know to what extent, and for how long, any changes resulting from life events, changes in perceptions, or variations in preferences influence someone's willingness to engage in a financial behavior that entails the possibility of loss. Are apparent changes in risk tolerance temporary or permanent?

Additionally, a longer-term tracking of client risk tolerance is needed. This study was limited to a five-year period. Tracking individuals over a much longer time horizon will provide greater insights into the consistency and persistence of risk attitudes. Future research can address these and other issues and help financial planners provide more adaptive advice and counsel to clients in the future. ■

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