The Impact of Immigrant Status and Racial/Ethnic Group on Differences in Responses to a Risk Aversion Measure

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Factors related to differences in risk aversion were analyzed with a measure of risk aversion inferred from answers to a hypothetical income gamble question in the U.S. Health and Retirement Study. Cumulative logistic regressions, controlling for income, age, gender, health status, current job status, and home ownership, showed that Blacks were more risk averse than Whites, but Hispanics born in the United States were not different from Whites. U.S. born respondents in an "other" group, largely Asian, were also not different from Whites. Hispanics and those in the other group who were immigrants were more risk averse than Whites. Racial/ethnic differences found in other risk aversion studies may be partly due to differences in immigrant status.

Key Words: immigrants, investments, racial/ethnic differences, risk aversion, risk tolerance

Introduction

In the literature, the vast majority of studies on racial/ethnic differences indicate that Blacks and Hispanics have lower risk tolerance than Whites (Yao, Gutter, & Hanna, 2005). The financial market participation of ethnic groups other than non-Hispanic Whites in the United States is relatively new (Chiteji & Stafford, 1999). Immigrants tend to be unfamiliar with using financial markets for asset accumulation. The lack of investment experience may lead them to be cautious when approaching the financial systems, and therefore risk averse to allocating their savings to investment assets such as stocks or mutual funds (Osili & Paulson, 2008).

The Yao et al. (2005) study showed racial/ethnic differences in risk tolerance in the United States by using the Survey of Consumer Finances (SCF) investment risk tolerance measure, which is the only risk tolerance question used in a nationally representative sample of U.S. households over a long period of time (Yao, Hanna, & Lindamood, 2004). One alternative measure, a set of experimental job-risk questions involving gambles over one's lifetime income, is employed in the Health and Retirement Study (HRS). The HRS was designed to provide a measure of relative risk aversion (Barsky, Juster, Kimball, & Shapiro, 1997). Hanna and Lindamood (2004) proposed that the HRS measure is the only measure of risk attitude that is rigorously linked to investment portfolio choices.

The current study extends the existing literature on risk tolerance in several different ways. The study fills the existing gap in the literature by examining the racial/ethnic differences in the HRS risk aversion measure. We further add to the literature by researching the association between being foreign born and risk tolerance using the HRS. Unlike the SCF, the HRS allows for identification of whether a respondent was born in the United States.

Literature Review
Normative Analyses of Portfolio Allocations and Risk Aversion
Campbell and Viceira (2002) and Viceira (1999) presented rigorous analyses of optimal portfolio allocation and concluded that levels of relative risk aversion were related to portfolio allocation. The researchers suggested that investors with levels of relative risk aversion under 2.0 should possess very risky portfolio allocations, while those with higher relative risk aversion should have more conserva-

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tive portfolio allocations, particularly when their levels of human wealth are low in comparison to their investment. Viceira's (1999) analysis implied a negative relationship between relative risk aversion levels and the proportion of financial investment in stocks. For example, a 50-year-old individual with a relative risk aversion level of 12 should allocate roughly 15% of financial investments into stocks, but a person with a relative risk aversion level of 5 should allocate about 50% into stocks, and a person with a relative risk aversion level of 2 should allocate over 100% of financial investments into stocks, buying on margin. Therefore, normative financial economics shows that the level of relative risk aversion is a very important factor in determining optimal investing; yet, measuring relative risk aversion is difficult.

Risk aversion, or its inverse, risk tolerance, has been measured using four different methods (Hanna, Gutter, & Fan, 2001). These four types of measures are based on investment choice (as in the case of the SCF), economic theory (Barsky et al., 1997; Kimball, Sahm, & Shapiro, 2008), multidimensional measures of risk tolerance comprising of questions drawn from economics, investments and psychology (Grable & Lytton, 1999; Hube, 1998), and assessment of actual behavior based on economic models (Arrow, 1965; Pratt, 1964). The SCF measure of risk tolerance (Yao et al., 2004) and the measure of relative risk aversion, which is based on the utility theory of economics (Barsky et al., 1997), have been used frequently as measures of individual risk tolerance in recent literature (Bucciol & Miniaci, 2011; Hanna & Lindamood, 2004; Hanna, Waller, & Finke, 2008; Hanna & Lindamood, 2010; Hanna, Guillemette, & Finke, 2013; Jianakoplos & Bernasek, 1998; Malmendier & Nagel, 2011; Neelakantan, 2010).

The SCF uses a risk aversion measure apparently based on casual consideration of investment theory (Yao et al., 2004). Authors in the 2004 Yao et al. study contacted Arthur Kennickell, project director of the SCF, personally and he informed them that the investment risk tolerance question in the SCF was included on the suggestion of Marshall Blume of the Wharton School, University of Pennsylvania. The Yao et al. (2004) paper further reported that although neither Blume nor Kennickell could recall an academic article that justified or validated the risk tolerance question, and they reported that the risk tolerance question was initially developed by the New York Stock Exchange. The SCF risk tolerance measure was first intro-

duced in the SCF in 1983 and is included in every wave from 1989 onwards. This risk aversion measure is based on a single question response concerning the amount of risk the respondent is willing to bear when making investment decisions. Sung and Hanna (1996) found that only about 4% of the respondents were willing to take substantial risks in their investment allocations. Use of the SCF risk measure has been questioned by several researchers in this area. Chen and Finke (1996) proposed that the SCF scale was a better indicator of an individual's financial situation than it was of their risk tolerance. Hanna and Chen (1997) questioned whether the SCF risk tolerance measure revealed true preferences, and Hanna et al. (2013) suggested that the SCF measure reflected not only risk tolerance but also risk capacity, expectations, and feelings about volatility. Hanna and Lindamood (2004) found that there was a correlation between the investment risk aversion measure (SCF) and a relative risk aversion measure (e.g., Barsky et al., 1997). The Hanna and Lindamood study also improved upon the relative risk aversion measure developed in the Barsky et al. (1997) study and presented the respondents with graphical options. The authors concluded that graphically represented relative risk aversion questions were better understood by the respondents. Gilliam, Chatterjee, and Grable (2010) found that the SCF measure of risk tolerance had lower explanatory power of portfolio allocations than other multi-dimensional measures of risk tolerance.

Conceptually, the SCF measure of risk tolerance is not grounded in economic theory, whereas the risk aversion measure in Barsky et al. (1997) was based on economic theory. Economists comparing household portfolio holdings to normative financial economic analysis have found that the amount of risk aversion required to justify the low holdings of equity investments is very high, a result known as the equity premium puzzle (Mehra & Prescott, 1985; Siegel & Thaler, 1997). Wang and Hanna (1997) suggested that a possible reason for the equity premium puzzle is that many households hold very low levels of liquid assets and therefore were unable to participate in equity investments. Wang and Hanna found that risky asset holdings increased with age, indicating that it may not be accurate to infer risk aversion from portfolio holdings. Barsky et al. (1997) attempted to resolve this issue by presenting a series of hypothetical job alternatives, such that the Arrow-Pratt measure of relative risk aversion can be inferred from the respondents choices (Hanna et al., 2001).

Racial/Ethnic Group and Risk Tolerance

Based on analyses of the risk tolerance question in the 1983-2001 SCF, Yao et al. (2005) found that Blacks and Hispanics were less likely to be willing to take some financial risk than were Whites. Even after controlling for income and other characteristics, significant differences remained, with Blacks and Hispanics less likely to take some risk but more willing to take substantial risk than similar Whites. Similarly, Gutter and Fontes (2006) found that Black households were less willing to invest in risky assets than the reference group of White households. They also found that the Black households were less willing to take financial risk than the White households.

Yao et al. (2005) proposed that the willingness to take investment risk, as measured by the SCF risk tolerance question, is influenced by market expectations, as well as underlying risk tolerance. Yao et al. (2005) excluded the other group, which includes mostly those of Asian origin (Hanna & Lindamood, 2008), but Yao et al. (2004) found that those in the other (mostly Asian) group were less likely than Whites to be willing to take investment risk. Market expectations might vary by financial experience, which varied across racial/ethnic groups, so finding that Blacks and Hispanics were less risk tolerant than Whites does not necessarily mean that true risk aversion varies by racial/ethnic groups. The SCF does not identify whether respondents are immigrants. As Hanna and Lindamood (2008) noted, in the 2000 Census, 40% of U.S. Hispanics and 69% of U.S. residents who identify themselves as Asian are foreign born, compared to 6% of residents identifying themselves as Black and to 4% of non-Hispanic Whites. The 2010 Census reveals similar patterns (U.S. Census Bureau, 2010). Therefore, the lower willingness to take investment risk by Hispanics and the other races is possibly related to immigrant status.

As previously noted, the SCF risk tolerance question is not rigorously developed or linked to optimal portfolio allocations, even though the measure has a long history in the Survey of Consumer Finances by the Federal Reserve Board (Yao et al., 2004). An alternate measure of risk tolerance is based on the responses to a series of hypothetical lifetime-income questions. The measure is based on expected utility theory from economics (Merton, 1969) and is the only measure of risk tolerance that is rigorously linked to the normative recommendations of financial economics (Hanna, Gutter, & Fan, 2001; Hanna & Lindamood, 2004; Hanna, Waller, & Finke, 2008; Hanna et al., 2013). This measure has been used by a number of previ-

ous studies on risk tolerance (Hanna, Gutter, & Fan, 2001; Kimball, Sahm, & Shapiro, 2008; Neelakantan & Chang, 2010). Participants in the Health and Retirement Study are asked these questions, which allows for estimated ranges of relative risk aversion as defined by the measure (Barsky et al., 1997). According to the Barsky et al. (1997) findings based on an early wave of the HRS, Whites were less likely than any other racial/ethnic group to have given the most risk tolerant response. Kimball et al. (2008) presented regression estimates for factors associated with a parameterized formulation of the answers to the job-risk questions. They concluded that Black and Hispanic respondents were not significantly different from non-Hispanic Whites in their risk tolerance, after controlling for income, net worth, age, education, and gender. However, as Yao et al. (2005) found, assumptions that risk tolerance has a monotonic relationship with household characteristics may not be reasonable, so it is important to test for patterns without restricting the nature of the relationships, as was implicit in the comparisons of mean levels done by Barsky et al. (1997) and Kimball et al. (2008).

Hsee and Weber (1999) found in their study of Chinese and American respondents that the Chinese respondents were more risk taking and had a higher investment risk tolerance than the American respondents. The authors attributed this difference to the differences in cultures between the United States and Mainland China. The authors found that in collectivist Chinese culture, the financially distressed individuals had the safety-net of their extended families to receive help, unlike the American households who lived in an individualistic society. Conversely, in another study of cultural differences in the risk perception of Australian and Korean households, the researchers found that Australians had a higher risk tolerance than the Korean respondents regardless of gender. The authors found that while the Korean households made riskier decisions as a group, individually, they were less risk tolerant than individual Australians. The authors attributed this difference in risk tolerance to the difference in Australian and Asian cultures (Kim & Park, 2010). Barsky et al. (1997) found in their analysis of the HRS risk measure that foreign born Americans were more risk tolerant than the native-born Americans. According to Barsky et al. (1997), the immigrants were somewhat self-selected to be more risk tolerant than the native-born Americans because of their willingness to leave their native countries and acceptance of the uncertainties and risks of migrating to a new country. However, another study of immigrant and native-born Americans found that the foreign-born were more risk

averse than the native-born Americans (Amuedo-Dorantes & Pozo, 2002). In this study, the authors found that the immigrants tended to have more extreme attitudes towards risk. Compared to the native-born Americans, a greater proportion of immigrants had very low and very high levels of risk tolerances on a scale of 0 to 3, where 0 = lowest level of risk tolerance and 3 = highest level of risk tolerance.

Overview

Previous theoretical studies have concluded that risk tolerance (or its inverse, risk aversion) affects the optimal portfolio allocation for investors, and an understanding of risk tolerance is thus necessary when recommending investment asset choices for individuals. In order to understand how well a risk tolerance measure reflects true preferences, it is important to analyze variations in risk tolerance by racial/ethnic groups and by whether the respondent is foreign born. In the following section, we outline the dataset and our empirical model for determining the likelihood of risk tolerance. Then, we investigate whether differences exist by racial/ethnic and foreign born status, controlling for various demographic, socioeconomic, and health-related factors.

Methods
Dataset
The University of Michigan Health and Retirement Study (HRS) is supported by the National Institute on Aging, and longitudinally surveys more than 22,000 Americans over the age of 50 every two years. The design and development of the HRS are intended to provide data for researchers, policy-makers, and program planners. The HRS data include retirement, health insurance, saving, and economic welfare-related information. In the current research, the 2004 HRS Core data were used. The HRS consists of household-level files and HRS tracker files. The household-level files include questions related to wages and salary income, self-employment income, homeownership, and real estate ownership. The HRS tracker files facilitate the use of HRS data within and across waves. This file includes one record for every person who was ever eligible to be interviewed in any wave. Each record includes basic demographic information, interview status, and if, when, and how an interview was conducted in each wave. The HRS provides cross-sectional weights and information on inter-respondent relationships as well, which are vital to almost all substantive analyses of the data. To make the sample more representative of the whole population, the weight variable from the 2004 tracker file was used for all

descriptive analyses. Table 1 shows selected characteristics of the sample.

Dependent Variable
In the 2004 survey, five questions related to job risk developed by Barsky et al. (1997) were asked to determine the risk aversion of respondents. The first question asked was:

> "*Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it by a third. Which job would you take—the first job or the second job?*"

Subsequent questions were similar in structure but vary in the hypothetical income loss. Based on answers to these income-gamble questions, six ranges of relative risk aversion were calculated based on the assumptions specified in Barsky et al. (1997) and Hanna et al. (2001). The answers provided by the financial respondent in couple households were used and also the spouse or partner of the financial respondent.

Independent Variables
Responses to questions about hypothetical choices of jobs were analyzed, which were not related to the current investments or investment choices. Barsky et al. (1997) and Hanna et al. (2001) assumed that relative risk aversion was constant over wealth, which would mean that a respondent's answers to these choices should be independent of assets and of current portfolio allocations. It is possible that in addition to true risk aversion affecting a respondent's choices, other characteristics, such as age, education, marital status, health, and employment status, could affect choices. It is also possible that risk aversion varies with these characteristics. The focus of the current research was on variations in responses by foreign born and racial/ethnic status of the respondent, controlling for age, gender, education, marital status, health, working status, homeownership, and income.

Statistical Methods
While there are six levels of relative risk aversion, our interest was in comparing foreign born and racial/ethnic status, with small percentages in respondents in some demographic categories, and small percentages of respond-

Table 1. HRS 2004, Descriptive Statistics (*N* = 2,996)

Variables	%	Variables	%
Immigration status of respondent		**Health condition of respondent**	
Born in the U.S.	88.53	Excellent	20.87
Not born in the U.S.	11.47	Very good	29.74
Racial/ethnic status of respondent		Good	28.30
Non-immigrant White	70.71	Fair	14.33
Immigrant White	4.05	Poor	3.77
Non-immigrant Black	10.45	**Working status of respondent**	
Immigrant Black	0.91	Work now	75.50
Non-immigrant Hispanic	4.78	Unemployed or temporarily laid off, sick or other leave	6.19
Immigrant Hispanic	5.32	Disabled	8.00
Non-immigrant other	2.59	Retired	2.54
Immigrant other	1.19	Homemaker or others	7.77
Less than high school	11.23	**Homeownership of respondent**	
High school	27.03	Own home	82.48
Some college	29.14	Not own home	17.52
B.S. degree	16.94	**Total household income**	
Post B.S. degree	15.66	*Mean* total household income	$70,290.91
Gender of respondent		*Median* total household income	$49,000.00
Male	53.01	**Mean age of respondent**	51.46
Female	46.99		
Marital status of respondent			
Married	68.28		
Separated or divorced	22.08		
Widowed	2.38		
Never married or other	7.26		

ents for some risk aversion responses. In order to have more robust estimates of effects, groupings of categories were appropriate. Also, since the risk tolerance variable in the current study was categorical in nature, ordinary least-squares-regression analysis was not appropriate (Greene, 2011). An ordered logistic regression was more suitable (Greene, 2011), but as Yao et al. (2004) suggested, a cumulative logistic regression analysis should be used if ordered logistic regression is shown to be inappropriate. Using the Yao et al. (2004) approach, the score test from the logistic regression indicated that ordered logistic regression was inappropriate, so the data were analyzed using a cumulative logistic regression.

The HRS oversamples Blacks, Hispanics, and Florida residents. Therefore, for descriptive analyses, weighted variables were used for obtaining results that were representative of the population of households in the age range covered by the survey. The multivariate analyses conducted in the current study were based on the unweighted sample (Lindamood, Hanna, & Bi, 2007).

Analysis and Results
Descriptive Analysis of the 2004 Health and Retirement Study
Descriptive statistics are shown in Table 1 for households answering the job risk question in the 2004 HRS wave. The HRS dataset included both primary and secondary

respondents. The primary respondent in the HRS was the family member most knowledgeable about the family's assets and income. The secondary respondents were the spouses or partners of the primary respondents (Barsky et al., 1997). Among the 2,996 respondents in this study (1,683 primary respondents and 1,313 secondary respondents), the average age was 51.5 with an age range of 29 to 56 among all respondents. The age range of the primary respondents was 50 to 56 with only 3.7% of the secondary respondents under the age of 40. The mean total household income was $70,291, and the median household income was $49,000. Almost half (53%) were male, 68% were in couple households, and 89% were born in the United States. The racial/ethnic distribution of non-immigrant respondents (as weighted proportions of the total sample) was 71% non-Hispanic White, 10% Black, 5% Hispanic and 3% other. The distribution of immigrant respondents was 4% non-Hispanic White, 1% Black, 5% Hispanic, and 1% other were immigrants. The other category included Asians, Native Alaskans and Pacific Islanders. The proportion of immigrants varied substantially among racial/ethnic groups with 5% being non-Hispanic Whites and 53% being Hispanic immigrants.

The dependent variable was risk tolerance (the inverse of risk aversion), which was measured by answers to a series of five hypothetical income gamble questions. Table 2 shows the unweighted number of responses and the weighted percentage in each of six risk aversion categories. Around 40% of respondents were in the least risk tolerant (and most risk averse) group, corresponding to a risk aversion level of over 7.5. The risk tolerance scores of respondents in the 2004 HRS were similar to the results reported by Kimball et al. (2008) for the 1994, 1998, 2000, and 2002 waves of the survey. Only 6% of respondents were in the most risk tolerant (least risk averse) category, corresponding to a risk aversion level of under 0.3.

The distribution of risk tolerance levels by demographic characteristics are shown in Table 3. Non-Hispanic Whites were the least likely of the four racial/ethnic groups to have the lowest risk tolerance level, with a likelihood of 37%, compared to 49% of Blacks, 48% of Hispanics, and 44% of others. Those in the other (mostly Asian) racial/ethnic group had the highest percentage of respondents in the two highest risk tolerance levels, followed by non-Hispanic Whites, Blacks, and Hispanics. A higher percentage of immigrants fell into the lowest risk tolerance level. Conversely, a lower percentage of immigrants fell into the highest risk tolerance level compared to respond-

ents born in the U.S. Also, a higher percentage of female respondents appeared in the lower risk tolerance categories; whereas a higher percentage of males appeared in the higher risk tolerance categories.

Based on the small percent of Black and Hispanic respondents (see Table 1) and the small percent of respondents with high risk tolerance levels (see Table 2), meaningful comparisons of the distribution of risk tolerance levels by ethnic groups were problematic in terms of obtaining robust estimates. The top three categories of risk tolerance levels were combined to obtain a new risk tolerance variable with four levels. The distribution is shown in the first section of Table 4. We also created cumulative categories, similar to those created from the SCF risk tolerance variable by Yao et al. (2004). Based on the original relative risk aversion levels and Viceira's (1999) optimal portfolio results for investors around age 50, the substantial risk tolerance level corresponded to an extremely aggressive investment portfolio with 75% or more allocated to stocks or stock-based mutual funds. The high risk tolerance level corresponded to a portfolio with at least 50% in stocks, and those at the level of "some risk" or lower (risk tolerance level 1) might have an optimal stock allocation of only 20%.

General Linear Model (GLM) means tests by racial/ethnic group and by immigrant status are shown in Table 5. Non-Hispanic White respondents were significantly more likely than Black and Hispanic respondents to be above the lowest risk tolerance level (having some risk tolerance, with relative risk aversion less than 7.5), while there were no significant differences between non-Hispanic Whites and those in the other category. Non-Hispanic White respondents were also significantly more likely than Black and Hispanic respondents to have high risk tolerance (and relative risk aversion of less than 3.8), but there were no significant differences between non-Hispanic Whites and other. However, White respondents were not significantly different from Blacks, Hispanics and respondents of other races at the substantial risk tolerance level (with relative risk aversion of less than 2.0). The GLM analysis also showed that U.S.-born respondents were significantly more likely than immigrants to have some, high, and substantial risk tolerance, when the comparison was between all immigrants and all non-immigrants. Compared to the immigrant Hispanic, Black, and Other immigrant groups, the non-Hispanic White non-immigrants, which was by far the largest of the non-immigrant groups, were significantly more likely to have some risk tolerance. Additionally, the non-Hispanic White non-immigrants were also more likely to have

Table 2A. Health and Retirement Study Job Risk Aversion Question

	Unweighted number of responses	Weighted % distribution
Accept Gamble 1 (50% chance of one-third loss of income), Gamble 2 (50% chance of one-half loss), and Gamble 3 (50% chance of 75% loss) Extremely Low Risk Aversion/Extremely High Risk Tolerance (A ≤ 0.31)	157	5.58
Accept Gamble 1 (50% chance of one-third loss of income), Gamble 2 (50% chance of one-half loss), reject Gamble 3 (50% chance of 75% loss) Very Low Risk Aversion/Very High Risk Tolerance (0.31 < A ≤ 1.00)	199	6.90
Accept Gamble 1 (50% chance of one-third loss of income), reject Gamble 2 (50% chance of one-half loss) Low Risk Aversion/High Risk Tolerance (1.00 < A ≤ 2.00)	271	9.93
Reject Gamble 1 (50% chance of one-third loss of income), accept Gamble 4 (50% chance of one-fifth loss) Moderately Low Risk Aversion/Moderately High Risk Tolerance (2.00 < A ≤ 3.76)	519	18.23
Reject Gamble 1 (50% chance of one-third loss of income), reject Gamble 4 (50% chance of one-fifth loss), accept Gamble 5 (50% chance of 10% loss) Moderate Risk Aversion (3.76 < A ≤ 7.53)	601	19.97
Reject Gamble 1 (50% chance of one-third loss of income), reject Gamble 4 (50% chance of one-fifth loss), reject Gamble 5 (50% chance of 10% loss) Extremely High Risk Aversion/Extremely Low Risk Tolerance (A > 7.53)	1,209	39.39

Note. A = relative risk aversion range based on answers to hypothetical income gambles in 2004 HRS.

high and substantial risk tolerance when compared with the group of Hispanic immigrants. However, non-Hispanic White immigrants were not significantly different from non-Hispanic White non-immigrants in risk tolerance.

Cumulative Logistic Regressions of Risk Tolerance
An ordered logistic analysis of risk tolerance was conducted first. However, a score test of whether the parallel assumption of ordered logistic regression was appropriate showed that it was not appropriate to use the ordered logit model. Therefore, cumulative logistic regressions were used. The results for logistic regressions (logits) for three cumulative levels of risk tolerance are shown in Table 6. The reference group was no risk tolerance. This procedure was similar to that used by Yao et al. (2004) and Yao et al. (2005). For the some risk logit, Black respondents were less likely than non-Hispanic White respondents to have some risk tolerance; however, Hispanics and respondents

in other racial/ethnic group were not significantly different from non-Hispanic Whites in some risk tolerance. The immigrant variable by itself did not have a significant effect, which implied the same pattern shown in the means tests in Table 5, that non-Hispanic White immigrants were not different from non-Hispanic White non-immigrants. In addition, the immigrant Hispanics and immigrant Others were less likely to have some risk tolerance.

For the high and substantial risk logits, immigrant status did not contribute to the likelihood of having high or substantial risk tolerance. The variables for racial/ethnic groups were not a significant factor in determining high risk tolerance, although the immigrant Hispanics were significantly less likely to have substantial risk tolerance.

Among other control variables, female respondents and respondents with poor self-reported health were less likely

Table 2B. Health and Retirement Study Job Risk Aversion Question

Gamble 1 (HRS variable JP036): "Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it by a third. Which job would you take – the first job or the second job?"

Gamble 2 (HRS variable JP037): "Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it in half. Which job would you take – the first job or the second job?"

Gamble 3 (HRS variable JP038): "Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it by seventy-five percent. Which job would you take – the first job or the second job?"

Gamble 4 (HRS variable JP039): "Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it by twenty percent. Which job would you take – the first job or the second job?"

Gamble 5 (HRS variable JP040): "Suppose that you are the only income earner in the family. Your doctor recommends that you move because of allergies, and you have to choose between two possible jobs. The first would guarantee your current total family income for life. The second is possibly better paying, but the income is also less certain. There is a 50-50 chance the second job would double your total lifetime income and a 50-50 chance that it would cut it by 10 percent. Which job would you take – the first job or the second job?"

to have some risk tolerance. Respondents with higher education levels and higher income levels were more likely to have higher risk tolerance. Similar to the Yao et al. (2004) results, fewer variables were significant in the high and substantial logits.

Conclusions
Very few studies have been done with multivariate analyses of immigrant status and racial/ethnic differences in the HRS risk aversion measure. The only previous studies we could find (Barsky et al., 1997; Kimball et al., 2008) used regression analyses of a linear estimate of risk tolerance, which may be inappropriate given the results of the Score test on our ordered logit. Our research makes a substantial contribution to this emerging area of research. There are, however, several limitations of our study, which creates a

need and scope for further research in this area. One of the limitations is that the risk tolerance measured here is based on hypothetical job questions. Although the scale is reliable and has been validated through a number of previous studies, a major issue with measuring risk tolerance is that there is no uniform scale of measurement and hence, some national surveys apply the scale that is used in the current study, while others used the investment risk tolerance scale (SCF), while other financial advisors and academic scholars used their individually developed measure of risk tolerance. There is a need to develop a uniform measure of risk tolerance that is both reliable and universally applicable. Another limitation of this study is that only 11% of the sample comprised of immigrants and 25% of the entire population were of non-White ethnicity. There is a need for deeper focused study over a larger sample of racial/eth-

Table 3. Relative Risk Aversion Levels by Demographic Characteristics, HRS 2004

Risk aversion level	> 7.53	3.77-7.53	2.01-3.76	1.01-2.00	0.32-1.00	< 0.31
Risk tolerance (rt)	1	2	3	4	5	6
Demographic characteristics	Lowest risk tolerance %		→		Highest risk tolerance %	
All households	39.39	19.97	18.23	9.93	6.90	5.58
Racial/ethnic status of respondent						
White	36.59	21.05	19.42	10.14	7.16	5.64
Black	48.81	14.57	13.93	11.72	5.98	4.99
Hispanic	48.24	17.45	15.48	7.88	5.71	5.23
Other races	44.28	20.67	14.00	5.91	7.97	7.15
Immigration status of respondent						
Born in the U.S.	38.17	20.42	18.79	10.20	7.03	5.38
Not born in the U.S.	49.81	16.14	13.42	7.55	5.82	7.26
Highest education of respondent						
Less than high school	54.25	12.51	14.58	7.22	6.44	4.99
High school	46.91	22.28	15.17	7.22	5.27	3.15
Some college	38.09	20.26	18.16	10.66	6.91	5.92
B.S. degree	33.11	19.75	21.09	11.22	7.94	6.89
Post B.S. degree	25.21	20.87	23.11	13.74	8.91	8.15
Gender of respondent						
Male	36.83	18.15	18.45	11.80%	8.60	6.17
Female	41.68	21.59	18.03	8.25%	5.39	5.05
Marital status of respondent						
Married	39.32	20.62	19.56	9.04	6.35	5.12
Separated or divorced	40.41	19.48	15.22	10.20	7.74	6.93
Widowed	39.09	27.09	15.08	5.45	8.73	4.56
Never married or other	37.08	13.04	15.78	18.93	9.00	6.17
Health condition of respondent						
Excellent	34.01	20.29	18.93	10.08	9.10	7.58
Very good	32.72	22.67	20.23	12.06	7.84	4.47
Good	44.32	18.59	17.69	8.24	5.34	5.83
Fair	44.08	19.26	15.26	10.19	5.85	5.36
Poor	55.21	14.25	15.68	6.50	4.71	3.64
Working status of respondent						
Work now	37.39	20.54	19.17	10.18	7.29	5.42
Unemployed or temporarily laid off, sick or other leave	39.53	22.64	17.05	11.61	6.09	3.07
Disabled	49.21	16.30	14.11	8.32	5.82	6.23
Retired	41.02	15.97	18.08	6.49	10.10	8.34
Homemaker or others	48.24	17.46	14.17	8.89	3.80	7.44
Homeownership of respondent						
Own home	38.39	20.40	18.89	9.85	7.08	5.43
Not own home	44.14	17.93	15.14	10.29	6.07	6.43

Table 4. Risk Tolerance Levels (Combined and Cumulative) by Racial/Ethnic Status of Respondent, HRS 2004

	All %	Whites %	Blacks %	Hispanics %	Other races %
Risk tolerance categories					
New risk tolerance 1 (rt = 1)	39.39	36.59	48.81	48.24	44.28
New risk tolerance 2 (rt = 2	19.97	21.05	14.57	17.45	20.67
New risk tolerance 3 (rt = 3)	18.23	19.42	13.93	15.48	14.00
New risk tolerance 4 (rt > 3)	22.41	22.94	22.69	18.82	21.04
Composite risk tolerance categories					
Substantial (rt > 3, risk aversion < 2.01)	22.41	22.94	22.69	18.82	21.04
High (rt > 2, risk aversion < 3.77)	40.64	42.36	36.62	34.30	35.04
Some (rt > 1, risk aversion < 7.53)	60.61	63.41	51.19	51.75	55.71
Weighted distribution in sample	100.00	74.83	11.32	10.00	3.76

Note. Weighted Analysis of 2004 HRS.
Rt = original risk tolerance levels as shown in Table 3.

Table 5. Test of Difference in Means of Cumulative Risk Tolerance Levels for Racial/Ethnic Groups and for Immigrant Status, HRS 2004

Comparison	Some risk	High risk	Substantial risk
	Difference between means	Difference between means	Difference between means
Racial/ethnic group			
Non-Hispanic White vs. Other	0.07694	0.07314	0.01898
Non-Hispanic White vs. Black	0.12218**	0.05734**	0.00248
Non-Hispanic White vs. Hispanic	0.11650**	0.08048**	0.04117
Other vs. Black	0.04524	-0.01579	-0.0165
Other vs. Hispanic	0.03957	0.00735	0.02219
Black vs. Hispanic	-0.00567	0.02314	0.03869
Immigration status			
Non-Immigrant versus Immigrant	0.11636**	0.07360*	0.01989**
Non-Hispanic White Non-Immigrant vs. Non-Hispanic White Immigrant	0.01441	0.01883	0.01812
Non-Hispanic White Non-Immigrant vs. Other Immigrant	0.10798**	0.01034	0.00934
Non-Hispanic White Non-Immigrant vs. Black Immigrant	0.09324*	0.05243	0.06924
Non-Hispanic White Non-Immigrant vs. Hispanic Immigrant	0.16035***	0.08393**	0. 03464**

$*p > 0.05.$ $** p > 0.01.$ $*** p > 0.001.$
Note. Weighted GLM Analysis of 2004 HRS, $N = 2{,}932$.

Table 6. Cumulative Logistic Regressions of Risk Tolerance, HRS 2004 (*N* = 2,956)

	Some Risk			High risk			Substantial risk		
	b	*SE*	*p*	*b*	*SE*	*p*	*b*	*SE*	*p*
Intercept	0.5921	0.5385		0.0108	0.6087		-0.5914	0.4998	
Age	-0.0146	0.2697		-0.0224	0.2177		-0.0306	0.0691	
Female	-0.2818	0.0072	***	-0.1973	0.0079	***	-0.4837	0.0708	***
Black	-0.5036	0.1109	***	-0.0050	0.1132		-0.1732	0.1009	
Hispanic	-0.0473	0.1748		-0.0125	0.1893		-0.1057	0.1644	
Other	0.2517	0.2290		0.0738	0.2922		0.1038	0.2480	
Immigrant	-0.0667	0.2109		-0.2866	0.2588		-0.2330	0.2288	
Immigrant interacted with Black	-0.0553	0.4910		0.4640	0.4721		-0.2925	0.4987	
Immigrant interacted with Hispanic	-1.1020	0.3388	***	-0.3091	0.3608		-0.9312	0.3281	***
Immigrant interacted with Other	-1.3824	0.4707	***	-0.1946	0.5043		-0.4048	0.4486	
High school	0.1948	0.1297		0.1559	0.1446		-0.3353	0.3160	
Some college	0.5025	0.1346	**	0.5611	0.1484	***	0.0811	0.1202	
College	0.7642	0.1419	***	0.9439	0.1555	***	0.4770	0.1275	***
Graduate	0.9384	0.1555	***	0.6234	0.0934	***	0.4883	0.1144	***
Divorced or separated	0.0125	0.1083		0.0481	0.1196		0.2398	0.1021	**
Widowed	0.3663	0.3564		0.0150	0.1756		0.2418	0.2468	
Never married/other	0.1632	0.1994		0.2140	0.0626	**	0.4454	0.1856	**
Very good health	0.1272	0.1054		0.1970	0.1426		-0.1696	0.1049	
Good health	-0.2086	0.1805		-0.1326	0.1191		-0.1724	0.1085	
Fair health	-0.0844	0.1321		-0.1152	0.1426		-0.2247	0.1278	
Poor health	-0.0834	0.0187	**	0.0519	0.2005		-0.0429	0.1721	
Retired	-0.0360	0.0903		-0.0769	0.1042		-0.0311	0.0908	
Disabled	0.3043	0.2513		0.3893	0.2285		0.2298	0.1917	
Unemployed	0.1843	0.3944		0.0643	0.4354		0.0140	0.2435	
Homemaker	-0.1143	0.3493		-0.0943	0.4493		0.1843	0.2704	
Log Income	0.0478	0.0299	***	0.0844	0.0349	**	0.0507	0.0155	**
Do not own home	0.068	0.103		-0.1691	0.1146		0.040842	0.09614	

*$p > 0.05$. ** $p > 0.01$. *** $p > 0.001$.
Note. Other races include: American Indian, Alaskan Native, Asian, and Pacific Islander.

nic groups and immigrants to fully understand the issues related to risk tolerance and risky asset ownership among immigrants.

Hispanics were significantly less likely than non-Hispanic Whites to have some risk tolerance or high risk tolerance. Controlling for other factors, however, the risk tolerance of non-immigrant Hispanic respondents was not significantly different from that of non-Hispanic White respondents. This differs with the results using the SCF investment risk tolerance variable (Yao et al., 2005) for which Hispanic respondents were significantly less likely to be willing to take some risk than otherwise similar White respondents. The SCF dataset does not include immigration status, but the difference between our results and those of Yao et al. (2005) could be due to the high proportion of immigrants among Hispanic respondents in the SCF datasets. The lack of significant differences in the HRS job risk tolerance measure between non-Hispanic Whites and non-immigrant Hispanics might also be due to the SCF risk tolerance variable not being related to true risk aversion, but instead being related to the understanding of investors or to their comfort levels regarding financial investments in the United States (e.g., Hanna et al., 2013). Also, the SCF question measures investment risk. Since many immigrants may initially mistrust the U.S. financial systems because of their previous negative experiences with the financial systems in their native countries, they may be more risk averse in terms of investment risk tolerance that the SCF question measures.

Blacks were significantly less likely than non-Hispanic Whites to have some risk tolerance or high risk tolerance. Even after controlling for the other variables in the model, Black respondents were significantly less likely than White respondents to have some risk tolerance, a result consistent with previous studies using the SCF risk tolerance measure (Yao et al., 2005). This result needs further investigation, although the cognitive burden of the HRS job-risk questions might be related to the result for the older, less-educated group of respondents in the HRS.

Hispanics were significantly less likely than Whites to have some risk tolerance, high or substantial risk tolerance. Even after controlling for other variables, immigrant Hispanics were less likely to have some or substantial risk tolerance than non-immigrant Whites, but there were not significant differences between non-immigrant Hispanics and Whites. This result was surprising, given the perception of risk taking immigrants, though it is possible that

limited English understanding might have made the hypothetical income-gamble questions harder to understand for some immigrants, given the cognitive burden of the HRS job-risk questions (Kimball et al., 2008).

The actual differences between non-Hispanic Whites and Blacks and between non-Hispanic Whites and Hispanics in the likelihood of being in the lowest risk tolerance (highest risk aversion) category might be due to the unwillingness of low-income respondents to risk any loss of income. When income and immigrant status were controlled, the non-Hispanic White-Hispanic differences were not significant. The results obtained were the first multivariate analyses of immigrants and of racial/ethnic differences in levels of the HRS Job-Risk measure. They should be interpreted cautiously in terms of implications for financial education and policy. Future research should investigate these differences in other age groups and surveys from other time periods.

This disparity in risk tolerance between the non-Hispanic White and other ethnic groups will be of interest to financial-service professionals. Previous studies have found that human-capital attainment is a positive predictor of risk tolerance among individuals (Grable, 2000). Since research finds that Blacks and Hispanics lag behind non-Hispanic Whites in human-capital attainment, better strategies that reduce this disparity need to be developed by economists and policy-makers. In the context of investment decisions, if Blacks and Hispanics are to increase their risk tolerance towards participation in financial markets, greater efforts in financial literacy and education need to be directed towards these groups.

The results indicate that Hispanic and other (largely Asian) immigrants are likely to be less risk tolerant than non-immigrant Whites. Unlike the findings from previous literature (Coleman, 2003; Sung & Hanna, 1996), non-immigrant Hispanics do not appear to have significantly lower risk tolerance than the non-immigrant Whites. To the extent that the HRS risk tolerance measure is consistent with the SCF investment risk tolerance measure (Hanna & Lindamood, 2004), this finding has important implications for financial counselors, educators and planners. According to Fry (2010), the majority of Hispanic adults are immigrants and Hispanics account for the majority of immigrants in this country since 1970 (Hirschman & Massey, 2008). Lower observed risk tolerance among immigrant Hispanics provide an opportunity for educators to design financial education programs that can reach the

immigrant communities. The Investment Advisors Act of 1940 requires that advisors consider the risk tolerance levels of their clients when making investment recommendations (Gerrans, Faff, & Hartnett, 2012). The differences in risk tolerance levels among various immigrant ethnic groups make it important for financial counselors and planners serving the immigrants to take into consideration the unique cultural differences that exist among various immigrant groups when designing their portfolios or developing their financial or debt management plans. The differences in risk tolerance also create an opportunity for financial institutions for developing products that can serve the immigrant communities who tend to be less likely to be risk tolerant than the non-immigrant majority Whites.

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