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# **Cultural Influences on Risk Tolerance and Portfolio Creation**

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## **Abstract**

We extend existing research that examines the impact of culture on risk tolerance. Using surveys completed by Chinese and American students, we find, consistent with previous studies, that Chinese students perceive themselves as more risk tolerant. However, we find that Chinese students are less consistent in matching their perceived tolerance levels with actual scores from a standard risk tolerance assessment. Further, we also examine mock portfolios created by the respondents and find no evidence that Chinese students create portfolios that are riskier than their American counterparts. Our findings suggest that differences in risk tolerance are at least partially a product of culture, but such differences may not always translate into actual investment decisions.

**Keywords:** Risk tolerance; Culture; Portfolios; Investments; Chinese

## 1. Introduction

Since Markowitz (1952) published his seminal work on efficient portfolios, academics and practitioners alike have sought ways to create portfolios containing the optimal balance of risk and reward. Generally speaking, this construct is associated with one of the most fundamental investment principles—a higher level of risk will only be accepted in exchange for a higher level of expected returns. However, while all investors may theoretically seek to maximize this tradeoff, in reality individual investors often choose the risk aspect of their portfolios based on their individual risk tolerance levels, which, for various reasons, may be less than objectively (i.e., rationally) determined.

While Markowitz (1952) suggests that all investors face the same tradeoff, and should therefore hold the same efficient portfolio, we recognize that in reality not all investors “price” risk in the same way. For some, excessive risk is the price they are willing to pay in exchange for seeking immense reward—i.e., the potential for a high outcome outweighs the additional risk of loss. For others, the stability of the reward is most highly valued, suggesting that such investors may forgo assets that could create more efficient (and higher return) portfolios, simply because they are uncomfortable taking on the added risk that such an asset would bring.

This “mispricing of risk”, for either those seeking excessive risk or for those seeking excessive stability, may be the result of at least two possible influences, both of which may be culturally conditioned. First, people (and people groups) obviously have different personalities, which likely leads to differences with regard to how they emotionally respond to loss (i.e., how they price risk). In an investing scenario, this emotional/psychological response may be proxied by a standard measure of risk tolerance. Second, while some investors may not exhibit emotional bias and therefore do accurately price risk, they may lack the knowledge to adequately implement their risk tolerance into appropriate portfolios. In either case, the portfolios of such investors may be less than optimal.

As a natural follow-up, we seek to determine if cultural differences influence one (or both) of these potential mispricing issues. In particular, we focus primarily on the potential differences between Chinese and American business students. We find, consistent with most prior studies, that Chinese students consider themselves to be more risk tolerant than their American counterparts, which may be driven by underlying cultural differences. We also find that the Chinese students receive higher scores on a standardized risk tolerance assessment, which is consistent with their perception of higher tolerance. However, it appears that the Chinese students are less able to accurately predict their risk tolerance ratings, particularly when comparing their perception of risk tolerance to their scores on the assessment.

To examine the potential impact of these differences, we ask students to select mock portfolio asset allocations. Given the higher risk tolerance for Chinese students, we would expect their portfolios to exhibit higher risk/reward attributes. Despite this, however, the Chinese students do not create higher risk portfolios. Rather, they select a higher percentage of money market instruments and government bonds in lieu of equities. Ultimately, we find the portfolios created by the Chinese

students have approximately the same risk level, on average, as the portfolios of their American student counterparts.

In sum, while our study supports the finding that the Chinese culture encourages higher risk tolerance levels, this risk tolerance does not seem to be backed with expected financial activities by students, suggesting that other factors may offset the cultural influence that Chinese market participants would otherwise exhibit. Our findings are consistent with differences in both culture and knowledge, the latter of which perhaps provides evidence for the contention of Fan and Xiao (2006) that Chinese individuals are generally less proficient with regard to financial knowledge. This contention is anecdotally appealing, given the fact that investing in Chinese financial markets is a relatively new phenomenon for Chinese citizens. While the US financial history is deep, many Chinese investors have never experienced a culture where investing in financial assets is the norm. This lack of historical experience would naturally suggest less financial literacy regarding financial market assets and activities.

## **2. Chinese culture and financial decision making**

Culture is an organic component of one's attitude towards all aspects of life, including financial decision-making. Understanding this influence is a critical component of creating an investment portfolio that matches the objectives of the individual, which is a notion that has not escaped the attention of researchers. For example, Statman (2008) examines risk tolerance in more than 20 countries and determines that significant differences exist in the way different cultures approach risk-taking activities.

Given our focus on the differences between Chinese and American investors, studies that examine these specific markets are of particular relevance. For example, Bontempo et al. (1997) examine business students and security analysts in both Eastern and Western cultures. They conclude that there are cultural differences between Chinese and Westerners in terms of risk perception. One well-documented manifestation of this difference (e.g., Charmon and Prasad, 2010) is the higher levels of savings rate among Chinese. Wei and Zhang (2011) suggest the increased savings rate is due to the higher ratio of male to females due to the one-child law, which they suggest explains about half of the increase in the savings rates. Others, however, have argued it is simply a manifestation of the Confucian lifestyle of self-discipline—i.e., the potential impact of culture. For example, Xiao and Fan (2002) find that Chinese workers are more likely to report a motivation for saving to simply be “investment in the future”.

Similar to the approach we employ, other studies have used university students as a fertile testing ground. For example, Fan et al. (1998) find that American students are more willing to take risks in the job market, but Chinese students are more willing to take risks with financial investments (at least perceived risks). Similarly, Weber and Hsee (1998) find that Chinese students are more risk tolerant in pricing risky financial options, and Hsee and Weber (1999) find that the Chinese are generally more risk tolerant in financial activities, but not medical or academic decisions. These results are also largely consistent with Weber et al. (1998), who find that Chinese and German proverbs provide more risk seeking advice than American proverbs, but only related to financial decisions and not social decisions.

One primary drawback of these studies is a focus on perceived risk tolerance and not actual portfolio decisions. As such, Fan and Xiao (2006) extend those studies mentioned above by examining investment behavior, and not just attitude towards risk. Using a sample of Chinese and American workers, they find that Chinese workers have a higher risk tolerance and are more likely to participate in risky financial market transactions. Given the use of actual portfolio selections (and not just perceived self-reported tolerance), our study most closely follows Fan and Xiao (2006). However, while we use a similar approach, our study differs in numerous ways.

First, we incorporate a more rigorous examination of risk tolerance, using a well-documented 13-question survey designed by Grable and Lytton (1999). Second, and more importantly, we more fully examine investment behavior in relation to perceived tolerance. For example, Fan and Xiao (2006) define risk-taking behavior using a dummy variable measuring the use of stock investment, whereas we ask respondents to create a mock portfolio that matches their desired risk level. This portfolio can include equity ownership of various types (small cap, large cap, international), as well as debt (corporate and government) and money market instruments.

Third, the use of both a subjective measurement of risk tolerance and a purely objective questionnaire similar to that used by the Survey of Consumer Finances allows us to measure the degree to which Chinese or American respondents can accurately predict their risk tolerance. Further, we believe that our data collection and completed sample are more consistent across subsamples, having been collected in an identical manner and assembled in uniform fashion. Thus, we believe our extension of the existing studies adds value by shedding additional light on the impact of culture on risk tolerance and financial decision-making.

### **3. Hypotheses development**

There are competing lines of thought with regard to predicting risk tolerance differences between Chinese and American cultures. On one hand, Douglas and Wildavsky (1982) argue that societies that promote individualistic decision-making (such as the United States) are more likely to be comprised of individuals who are more willing to take risk, since they are more appreciative of the uncertainties; whereas, hierarchical and bureaucratic societies (such as China) are more cautious and therefore likely to be more risk averse.

This notion is supported by Doyle (1999), who suggests that the world is divided into four approximate cultures. Of those, the “Drivers”, which includes most Europeans, are characterized by determination and appreciate excess return that taking risk can provide. In contrast, the “Analytics” cultures, which would include most Asian economies, are more likely to practice caution and constraint, with an associated aversion to risk. All of this would suggest that Chinese culture encourages higher risk aversion, or lower risk tolerance, than American culture. Adding to this belief, Sung and Hanna (1996) and Grable and Lytton (1998) find a positive relationship between economic resources and risk tolerance. Since resources in China, at least for the average investor, are lower than that of America, this would again suggest that the Chinese would be, on average, more risk averse.

In contrast to this expectation, however, most studies (as noted above) find the opposite to be true, as the Chinese generally have a higher tolerance for financial risk. Building upon Hofstad (1980),

Weber and Hsee (1998) propose the “cushioning hypothesis”, which suggests that individuals in a *collectivistic* society (such as China) are likely to receive financial assistance from their familial and social networks should they be in need (perhaps due to a loss of funds from a risky investment gone awry). As a result, they perceive risks in financial decisions lower than those who reside in an *individualistic* society (such as the US), where individuals are more likely to be left to fend for themselves. Thus, despite perhaps a better understanding of the reward for bearing risk, those in individualistic societies (i.e., Americans) are unwilling to do so for lack of the “safety net” of support from their networks. Building upon the “cushioning hypothesis”, we propose the following initial hypotheses:

H1:

Chinese respondents will perceive themselves as more risk tolerant than American respondents.

H2:

Chinese respondents will score as more risk tolerant on a standard risk assessment questionnaire.

Confirmation of the above two hypotheses will provide additional, stronger evidence in favor of existing findings; however, we seek to add incremental value by extending our contribution. In particular, we further the analysis by examining whether the higher risk tolerance levels of the Chinese sample (assuming confirmation of hypotheses 1 and 2) are significantly correlated to actual investment decisions. This expectation follows Hoffmann et al. (2013), who find that changes in trading and risk taking behavior are driven by changes in risk perception. Further, Hoffmann et al. (in press) find that risk tolerance is a significant driver of portfolio decisions. Thus, we question whether any cultural difference in risk tolerance is manifested in actual portfolio allocation decision. This expectation leads to the following hypothesis:

H3:

Chinese students will select portfolio allocations that are riskier than American students.

#### **4. Data description**

We compiled our data using a set of surveys administered to university students in both the US and China. Data collection was completed in Fall 2012. The sample of American students ( $n=215$ ) was gathered at a public University in the southeast US, and the sample of Chinese students ( $n=620$ ) was gathered at two Universities in mainland China. In Part A of the survey, we gathered responses to questions in three general categories: (1) individual characteristic data, (2) personal risk tolerance perception, and (3) measured risk tolerance. For reference, we have included the full survey in Appendix. The included survey is the “American” version. The Chinese version would be similar, with the exception of values being provided in scaled local currency.

In Part A of the survey, we ask respondents a variety of control questions, including their nationality, gender, and chosen major. In addition, respondents provided the education level and annual income of their parents. These latter two variables were included to help gauge the affluence of the respondents, which Sung and Hanna (1996) and Grable and Lytton (1998) suggest could

potentially impact risk tolerance. Finally, we asked the respondents to list any finance courses they were currently taking or had taken prior to completing the survey, as well as to inform us if they currently had checking accounts or experience trading stocks or bonds. These variables were designed to control for the level of financial and investment literacy of the respondents.

In Part B of the survey, we asked the respondents to provide their opinions on the likelihood that they will manage their own money in the future. Using a four-point scale, possible responses range from 4 (certainly) to 1 (certainly not). We also asked the respondents to gauge their perception of their knowledge level of investments, again on a four-point scale (very high to very low). More importantly, we also asked them to self-assess their risk tolerance by selecting one of the following categories: *aggressive*, *moderately aggressive*, *moderately conservative*, or *conservative*. This question type is similar to the single (four-response option) risk aversion question employed by the Survey of Consumer Finances (SCF), which asks the respondent to choose between options that range from being *willing to take substantial financial risk expecting to earn substantial returns* to *not willing to take any financial risk*.

Also in Part B of the survey, the respondents were assigned the task of creating a mock investment portfolio by selecting allocations across the following general asset classes: money market (or savings) account, domestic government bonds, domestic corporate bonds, large capitalization domestic equities, small capitalization domestic equities, and international equities. The chosen combination was then used to estimate expected returns, risks, and reward-to-risk ratios using historical market returns for the various asset classes.

To provide a more robust measure of risk tolerance, Part C of the survey consisted of an extended 13-question risk tolerance assessment as created by Grable and Lytton (1999). Grable and Lytton (2003) and Gilliam et al. (2010) find the aforementioned survey does a better job of accurately measuring risk tolerance than the single question offering of the SCF. Once we collected the survey responses, we then created a numerical value (using the accompanying scoring scale provided by Grable and Lyon, 1999) and assigned a risk tolerance level. A secondary objective of the study is to compare the results of the assessment with the subjective opinions of the respondents and compare the accuracy rates between the two cultural subsamples.<sup>1</sup>

## **5. Summary statistics**

Table 1 presents summary statistics for the entire sample, as well as subsamples for the US and Chinese respondents. We have a total sample of 835 responses, of which 620 are Chinese students and 215 are American students. Of note is that surveys were only administered to juniors, seniors, and graduate students in the US. In contrast, the surveys were administered to all levels of the undergraduate spectrum for Chinese students, but not graduate students. This would suggest the American students in our sample would have more maturity and perhaps more investment-related experience, but our summary statistics suggest otherwise. For example, 88% (29%) of Chinese respondents had completed or were taking at least one finance (investments) course, compared to only 34% (7%) of American students.<sup>2</sup> However, to complicate the issue even more, American students have considerably more investment-related experience in terms of checking accounts or trading stocks and bonds. The majority of Chinese participants were finance majors, compared to

only 13% of the American sample. The major of choice for the American sample was general business administration.

**Table 1.**

Summary statistics. The following table presents summary statistics for the total sample, as well as subsamples segmented by country. The final column provides the pp-value from a difference of means test between the two subsamples. *Freshman*, *Sophomore*, *Junior*, *Senior*, and *Graduate* are all dummy variables that represent the academic class of the student. *Female* is a dummy variable equal to one if the respondent is female, zero otherwise. *Acct*, *BA*, *Econ*, *IntB*, and *FINC* are all dummy variables equal to 1 if the student is an accounting, business administration, economics, international business, and finance major, respectively. *DadCollPlus* (*MomCollPlus*) is a dummy variable equal to one if the respondent's father (mother) holds at least an undergraduate degree, zero otherwise. *DadGrad* (*MomGrad*) is a dummy variable equal to one if the respondent's father (mother) holds a graduate degree, zero otherwise. *ParentLowEd* is a dummy variable equal to one if neither the respondent's mother nor father holds at least an undergraduate degree. *ParentHighEd* is a dummy variable if either the respondent's father or mother holds more than an undergraduate degree. *HighIncome* is a dummy variable equal to one if the respondent's parents earned in excess of either \$100,000 (US students) or ¥100,000 (Chinese students), zero otherwise. *LowIncome* is a dummy variable equal to one if the respondent's parents earned less than \$50,000 (US students) or ¥50,000 (Chinese students), zero otherwise. *IntroFINC* is a dummy variable equal to one if the respondent had completed an introductory finance course, zero otherwise. *InvCourse* is a dummy variable equal to one if the respondent had completed at least one investment specific course, zero otherwise. *Check*, *Bond*, and *Stock* are dummy variables equal to one if the respondent has experience with a checking account, trading bonds, or trading stock, respectively, zero otherwise. *ManageYes* is a dummy variable equal to one if the student respondents feel they are either likely or certain to manage their own money in the future, while *ManageNo* is a dummy variable equal to one if the student respondents feel they are unlikely or will certainly not manage their own money in the future. *KnowledgeHigh* is a dummy variable equal to one if the student respondents feel their knowledge level is either very high or somewhat high. *KnowledgeLow* is a dummy variable equal to one if the student respondents feel their knowledge levels are either very low or somewhat low.

	Total USA China pp-val			
<b>N</b>	835	215	620	
<b>Freshman</b>	0.19	0	0.26	–
<b>Sophomore</b>	0.22	0	0.30	–
<b>Junior</b>	0.32	0.33	0.32	0.9864
<b>Senior</b>	0.24	0.61	0.11	0.0000***
<b>Graduate</b>	0.02	0.06	0.00	0.0012***
<b>Female</b>	0.58	0.34	0.66	0.0000***
<b>Acct</b>	0.08	0.17	0.05	0.0000***
<b>BA</b>	0.14	0.42	0.04	0.0000***
<b>Econ</b>	0.06	0.21	0.00	0.0000***
<b>IntB</b>	0.04	0.17	0.00	0.0000***
<b>FINC</b>	0.53	0.13	0.67	0.0000***
<b>DadCollPlus</b>	0.31	0.75	0.15	0.0000***
<b>DadGrad</b>	0.10	0.33	0.01	0.0000***
<b>MomCollPlus</b>	0.27	0.79	0.10	0.0000***



	Total USA China pp-val			
<b>MomGrad</b>	0.06	0.22	0.01	0.0000***
<b>ParentLowEd</b>	0.66	0.14	0.83	0.0000***
<b>ParentHighEd</b>	0.11	0.41	0.01	0.0000***
<b>HighIncome</b>	0.23	0.67	0.08	0.0000***
<b>LowIncome</b>	0.59	0.11	0.76	0.0000***
<b>IntroFINC</b>	0.85	0.34	0.88	0.0002***
<b>InvCourse</b>	0.24	0.07	0.29	0.0000***
<b>Check</b>	0.87	0.96	0.84	0.0000***
<b>Bond</b>	0.09	0.27	0.02	0.0000***
<b>Stock</b>	0.16	0.47	0.06	0.0000***
<b>ManageYes</b>	0.91	0.89	0.92	0.1591
<b>ManageNo</b>	0.09	0.11	0.08	0.1396
<b>KnowledgeHigh</b>	0.19	0.47	0.09	0.0000***
<b>KnowledgeLow</b>	0.81	0.53	0.91	0.0000***

\*, \*\*, and \*\*\* represent significance at the 10%, 5%, and 1%, respectively.

We find, as expected, a large difference in parent education level. Only 1% of Chinese respondents had parents who completed an advanced degree, compared to over 40% of American students (although this may also be driven by demographic information of the respondents). The same is true for income. We find that roughly two-thirds of American respondents had parents who generated high income (defined as more than \$100,000 per year). This is compared to only 8% of Chinese parts who received an annual income in excess of ¥100,000 (approximately \$14,000 USD). Thus, as would be expected given the demographics of the respective higher education institutions, the American students have a more pronounced background of financial fluency and familial education.

Interestingly, however, we find almost no difference in the percentage of students that plan to manage their own money later in life. The Chinese number (92%) is insignificantly higher than the American value (89%). Americans, on the other hand, have a much stronger belief concerning their knowledge levels, with nearly half believing their levels were “somewhat high” or “very high”. This is compared to only 9% from the Chinese sample. Whether this is due to hubris on the part of the American students or whether it represents a genuine dichotomy in the knowledge levels can be at least partially examined as we measure the respondents’ ability to accurately predict their risk tolerance levels.

As part of the analysis, we also calculate risk and return variables based upon historical data from each country. These historical data are presented in Table 2. For the majority of the US asset categories, the data were collected from Jordan et al. (2012) and are well-documented measures of risk and return in each asset class. However, the Chinese data equivalent is, on many levels, unavailable. Chinese financial markets are relatively young in comparison to the US system. Comparable index values are unavailable for China prior to the turn of the 21st century. In fact, in order to identify a proxy for each asset class listed for the US, we were forced to use only eight years of data (2004–2012). The specific definitions of the asset classes for both countries are listed below:

**Table 2.**

Return and risk data. The following table presents return and risk data for asset classes in the US and China as of the end of 2012. The *Average* is the simple arithmetic mean of yearly returns across the period, while the *StDev* is the standard deviation of returns. *Sharpe* is the reward-to-risk ratio, calculated as the difference between the respective risky asset class and the money market instrument, divided by the standard deviation of the risky asset class. Data are from Jordan et al. (2012) and the China Stock Market Trading Database, respectively.

	Large cap	Small cap	Corp bond	Gov't bond	Int'l	MoneyMkt
US						
<b>Average</b>	11.7%	17.7%	6.5%	5.9%	9.8%	3.8%
<b>StDev</b>	20.5%	37.1%	7%	11.9%	28.1%	3.1%
<b>Sharpe</b>	0.39	0.37	0.39	0.17	0.21	0.00
Chinese						
<b>Average</b>	19.4%	22.8%	6.7%	4.5%	10.9%	2.8%
<b>StDev</b>	34.2%	38.1%	3.7%	2.2%	21.1%	0.5%
<b>Sharpe</b>	0.49	0.53	1.05	0.81	0.11	0.00

Category	United States proxy	Chinese proxy
<b>Large cap stocks</b>	Standard and Poor's 500	CITIC Standard and Poor's 300 index
<b>Small cap stocks</b>	Smallest 20% of the New York stock exchange	CITIC Standard and Poor's small cap index
<b>Corporate bonds</b>	High quality bonds with 20 years to maturity	SSE Corporate bond index
<b>Government bonds</b>	US Government bonds with 20 years to maturity	SSE Government bond index
<b>Money market</b>	Treasury bills with three-month maturity	CSI Central Bank note 1 index
<b>International</b>	iShares MSCI EAFE Index Fund (ETF)	Spliced index of the S&P500 and the MSCI EAFE (ex-China)

All US data other than the iShares MSCI EAFE Index Fund ETF are based upon annualized returns from 1926 to 2012. This particular fund began trading in 2001; thus we use the time period of

2001–2012 for that measurement period. The Chinese data were collected from the Wind Chinese Financial Database.<sup>3</sup>

The reported *Average* is the simple arithmetic mean of yearly returns across the time period, while the *StDev* is the standard deviation of the yearly returns. *Sharpe* is the reward-to-risk ratio, calculated as the difference between the respective risky asset class and the money market instrument, divided by the standard deviation of the risky asset class. Both small cap and large cap equities provide a higher risk–reward tradeoff in China relative to the US. International equity returns are very similar for the two, with the Chinese version having a lower level of volatility.

The bond market risk/return tradeoff is also very interesting for the two samples. The average returns for both corporate and government bonds are similar between the two countries, with corporate bonds having slightly higher returns in China, while government returns are somewhat lower. Of more interest, the risk levels of both are much lower for the Chinese market. In fact, the standard deviation is lower for Chinese government bonds than for US money market instruments, which is the asset class Americans typically consider safest of all.

## 6. Results

### 6.1. Bivariate analysis

In Table 3, we begin our examination on a bivariate basis, and, similar to Table 1, we report the data in total as well as by subsamples (with results from associated difference tests). In Panel A, we examine the students' chosen beliefs regarding their risk tolerance. We find that 5% of American respondents view themselves as aggressive (*Agg*), compared to 7% of Chinese students, which is the ordinal relationship we would expect. However, the difference is insignificant. The same is true for the proportion that viewed themselves as moderately aggressive (*ModAgg*). Collectively, we create a variable labeled *HigherTolBelief*, which is simply a dummy variable equal to one if the students felt they were either moderately aggressive or aggressive. While a slightly larger proportion of Chinese students feel they have a higher risk tolerance, this difference is also insignificant between the two subsamples.

**Table 3.**

Bivariate analyses. The following table presents bivariate analysis of the sample, segmented by American and Chinese students (with the pp-value from associated difference tests). Panel A presents results from the student's response when asked to gauge their risk preference. *Agg*, *ModAgg*, *ModCons*, and *Cons* represent aggressive, moderately aggressive, moderately conservative, and conservative risk preference, respectively. Panel B presents the student's average chosen portfolio, where *MoneyMkt*, *GovtBond*, *CorpBond*, *LC*, *SC*, and *Intl* represent Money Market Instruments, government bonds, corporate bonds, large-cap equities, small-cap equities, and international equities, respectively. *ExpRet* is the expected return of the students' ideal portfolios. *StDev* is the standard deviation of the portfolios. *Sharpe* is the Sharpe ratio of the portfolio, calculated as *ExRet* minus the risk-free rate, divided by *StDev*. Panel C presents statistics related to the risk tolerance assessment designed by Grable and Lytton (1999). *RiskTolScore* is the student's score on the assessment. *LowTol*, *BATol*, *ATol*, *AATol*, and *HighTol* are dummy variables used to qualify the student's assessment result (low, below average, average, and above average, respectively). *RiskTolMatch* is a dummy variable equal to one if the student's score on the risk tolerance assessment matches their belief of their risk tolerance, zero otherwise. pp-values are reported based upon standard tt-tests assuming unequal variance.

Var	Total	USA	China	pp-val
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Panel A: Student's belief

<b>Agg</b>	0.07	0.05	0.07	0.2109
<b>ModAgg</b>	0.45	0.44	0.46	0.4911
<b>ModCons</b>	0.42	0.42	0.43	0.7308
<b>Cons</b>	0.05	0.09	0.04	0.0114**
<b>HigherTolBelief</b>	0.52	0.49	0.53	0.2063

Panel B: Student's chosen portfolio

<b>MoneyMkt</b>	0.41	0.32	0.44	0.0000***
<b>GovtBond</b>	0.18	0.15	0.20	0.0000***
<b>CorpBond</b>	0.12	0.14	0.11	0.0013***
<b>LC</b>	0.13	0.18	0.12	0.0000***
<b>SC</b>	0.09	0.12	0.07	0.0000***
<b>Intl</b>	0.08	0.10	0.07	0.0531*
<b>NumbAssets</b>	4.72	4.98	4.63	0.0036***
<b>ExpRet</b>	7.44	8.16	7.65	0.0000***
<b>StDev</b>	8.40	10.95	7.74	0.0000***
<b>Sharpe</b>	0.53	0.39	0.58	0.0000***
<b>ExpReturnAdj</b>	0.75	0.87	0.71	0.0000***
<b>StDevAdj.</b>	0.65	0.84	0.58	0.0000***
<b>SharpeAdj.</b>	0.99	0.92	0.90	0.3004

Panel C: Assessment results

<b>RiskTolScore</b>	28.56	27.83	28.81	0.0015***
<b>LowTol</b>	0.01	0.01	0.01	0.5219
<b>BATol</b>	0.07	0.06	0.07	0.5315
<b>ATol</b>	0.39	0.47	0.36	0.0054***
<b>AATol</b>	0.34	0.36	0.34	0.5264
<b>HighTol</b>	0.18	0.09	0.21	0.0000***
<b>RiskTolMatch</b>	0.65	0.71	0.63	0.0380**

\*Significance at the 10% level.

\*\*Significance at the 5% level.

\*\*\*Significance at the 1% level.

The greatest, and only significant, difference between the two subsamples is that only 4% of Chinese respondents classify themselves as conservative (*Cons*), while 9% of American respondents chose this classification. On the surface, these results do little to support the notion that Chinese are more risk tolerant than Americans. However, given our finding that the set of respondents may have different attributes (e.g., parental education, income, etc.), some of the true underlying relations may be obscured.

In Panel B, we examine the students' responses in relation to their desired portfolio allocations. Perhaps surprisingly, we find the largest allocation for both subgroups to be in the money market instrument. There were several respondents who placed all (or nearly all) of their allocation in the safety of the money market selection (*MoneyMkt*). Given our observations regarding the data in Table 2, some of the findings are particularly interesting. Chinese students allocated 20% to government bonds and 44% to the money market, both of which are significantly higher than the American student's allocation. This is perhaps due to the strong influence of government in the Chinese economy, which encourages a high degree of trust in that entity. Given the relatively high weighting in these "safe" asset classes, there must naturally be a tradeoff elsewhere. This tradeoff comes in significantly smaller allocations in all three equity classes (small cap, large cap, and international). On the surface, this contradicts the notion that Chinese respond to their increased risk tolerance by actually creating riskier portfolios (Hypothesis 3).

Further results from Panel B of Table 3 indicate that Chinese students invest in fewer asset classes (*NumbAssets*) than the American respondents, which suggests a lower degree of diversification. This is consistent, on a very surface level, with the notion that Chinese are more risk tolerant than US students. However, we extend the bivariate analysis by calculating expected returns and standard deviations from the allocation weightings provided by the students and the historical data provided in Table 2. The results suggest that American students have higher portfolio standard deviations (*StDev*) and corresponding higher expected returns (*ExpRet*). The differences are highly significant.

The difference between the Sharpe Ratios (*Sharpe*) is also highly significant, but favors the Chinese, suggesting that their portfolios are more efficiently created. However, as can be noted from Table 2, the returns and/or risk are not uniform across asset classes between the two countries. Thus, the raw values of *ExpRet*, *StDev*, and *Sharpe* are not purely comparable between the two samples. To address this issue, we scale each variable by the result found from creating a simple equally weighted portfolio in each country. For example, if one were to put 16.67% in each of the six "U.S." asset classes, the result would be an expected return of 9.2% and a standard deviation of 12.8% (correlation adjusted). The equivalent values for the Chinese sample are 11.2% and 13.1%, respectively. Thus, any calculated value for *ExpRetAdj*, *StDevAdj*, or *SharpeAdj* that is greater than 1 indicates a portfolio with values above the average portfolio. When examining the

differing levels of these variables, we again find higher levels of risk and return for the American respondents. However, scaling the Sharpe variable caused the statistical differences between the two samples to disappear.

Thus, the summary evidence suggests that American students actually create portfolios that demonstrate higher risk tolerance than Chinese students. This is based, however, solely upon the students' chosen portfolio allocations. We now turn to a standardized assessment, as created by Grable and Lytton (1999, 2003), to measure risk tolerance in a more robust setting. In particular, the maximum score that can be received is 43, indicating the ultimate risk tolerance; whereas, the minimum is 13, indicating ultimate risk intolerance.

In Panel C of Table 3, we find the average score (*RiskTolScore*) of our total sample to be 28.56, with a standard deviation of 4.38. These values are nearly identical to the 28.83 and 4.49 produced by Grable and Lytton (2003) in measuring the validity of the survey. The Chinese group scored higher (28.81) than the American group (27.83), indicating higher risk tolerance. This is consistent with the hypothesis that Chinese investors are more risk tolerant than American investors, but, interestingly, it contradicts some of the bivariate results based on actual portfolio selections.

To further examine the data, we used the following categories to segment the quantitative results of the assessment test, and we report these results in Panel C of Table 3:

**Score Risk tolerance level**

**0–18** Low tolerance for risk (*LowTol*)

**19–22** Below-average tolerance for risk (*BATol*)

**23–28** Average/moderate tolerance for risk (*ATol*)

**29–32** Above average tolerance for risk (*AATol*)

**33–47** High tolerance for risk (*HighTol*)

We find that much of the reason for the differential in overall average score is driven by the *HighTol* classification. Twenty-one percent of Chinese students fall in this category, while only 9% of American students fall here. In contrast, the American students are more likely to be average in risk tolerance. Combining these results with those from Panel A suggests that at least a portion of Chinese students are more risk tolerant than they believe themselves to be. However, again, Panel B suggests that they do not plan to trade according to this belief. In short, it appears, solely from summary statistics, that Chinese investors perceive themselves as being more risk tolerant, but they do not select asset allocations that are consistent with a higher tolerance. So, while culture may increase their tolerance perception, a lack of investment knowledge and/or experience may potentially hinder them from putting such perceptions into practice.

Finally, we create the variable *RiskTolMatch*, which is a dummy variable equal to 1 if the student's chosen risk tolerance matches his/her qualitative classification from the tolerance assessment test. Given the differing number of categories, we create *RiskTolMatch* to be equal to 1 if:

<b>Students felt they were (Panel A):</b>	<b>And scored as (Panel C):</b>
<b>Aggressive (Agg)</b>	High or above average tolerance ( <i>HighTol</i> or <i>AATol</i> )
<b>Moderately aggressive (ModAgg)</b>	Above average or average tolerance ( <i>AATol</i> or <i>ATol</i> )
<b>Moderately conservative (ModCons)</b>	Average or below average tolerance ( <i>ATol</i> or <i>BATol</i> )
<b>Conservative (Cons)</b>	Below average or low tolerance ( <i>BATol</i> or <i>LowTol</i> )

Consistent with our expectation, given the finding that Chinese students score more risk tolerance than they self-assess, we find a higher probability of American students correctly predicting their risk tolerance. The difference of 71% versus 63% is significant at the 5% level. This is further evidence of a more refined level of financial knowledge across the American students. However, given the differences in academic class and parental characteristics, we must examine these issues in a multivariate framework to control for these underlying relationships.

## 6.2. Multiple level bivariate analysis

We extend the analysis of the assessment score results by segmenting the sample into additional subcategories. In Panel A of Table 4, we examine each of the four possible selections for risk tolerance based upon the students' self-perception. We then examine their risk tolerance score (*RiskTolScore*) and their ability to match their score with their perception (*RiskTolMatch*). We report the results of this analysis in Table 4. We find that the average scores by category are generally consistent with the student perceptions, meaning the more aggressive they believe themselves to be, the higher they score. The notable exception is among those US students that label themselves as conservative, which score higher than those that label themselves as moderately conservative.

Table 4.

Risk assessment and beliefs. The following table presents bivariate analyses of the total sample, segmented by the respondent's chosen level of risk tolerance (Panel A) and their opinion on knowledge and desire to manage their own funds (Panel B). For each of the four chosen risk tolerance levels, Panel A compares the respondent's score on the risk tolerance questionnaire (*RiskTolScore*). In addition, *RiskTolMatch* is a dummy variable equal to 1 if the student's chosen tolerance rating is consistent with their score on the tolerance questionnaire, zero otherwise.

Chosen rating	RiskTolScore			RiskTolMatch		
	USA	Chinese	pp-val	USA	Chinese	pp-val
Panel A: Risk tolerance belief						
<b>Aggressive</b>	31.00	31.00	0.9981	0.91	0.80	0.3460
<b>Mod. Agg.</b>	28.95	29.90	0.0195**	0.85	0.70	0.0012***
<b>Mod Cons.</b>	26.45	27.69	0.0072***	0.70	0.55	0.0117**
<b>Conservative</b>	26.80	24.04	0.0554*	0.05	0.42	0.0030***

Chosen rating	RiskTolScore			RiskTolMatch		
	USA	Chinese	pp-val	USA	Chinese	pp-val
Panel B: Knowledge and desire to manage						
<b>KnowledgeHigh</b>	28.60	29.18	0.4502	0.68	0.63	0.4696
<b>KnowledgeLow</b>	27.17	28.77	0.0000***	0.73	0.63	0.0478**
<b>ManageYes</b>	27.90	28.73	0.0099***	0.71	0.64	0.0694*
<b>ManageNo</b>	27.29	29.83	0.0282**	0.74	0.59	0.3162

\* Significance at the 10% level.

\*\*Significance at the 5% level.

\*\*\*Significance at the 1% level.

There is nearly an identical score rating between US and Chinese students that label themselves as aggressive. Chinese students that label themselves as moderately aggressive or moderately conservative both score significantly higher than their American counterparts. The opposite is true for the respective students that label themselves as conservative. The *RiskTolMatch* results suggest some interesting takeaways. Of note is the fact that the ability to match risk tolerance decreases as one moves from being aggressive to being conservative. Also of note is the observation that the American students classifying themselves as anything other than conservative have a better understanding of their risk tolerance than Chinese students. This again adds support for a differential lack of financial knowledge.

In Panel B of Table 4, we segment the sample into students that felt they had a high level of knowledge (either “very high” or “somewhat high”) of investments from those that believed they had a low (either “somewhat low” or “very low”) level. In addition, we also segment based on those that believe they will manage their money (either “certainly manage” or “likely to manage”) versus those that do not believe (either “unlikely to manage” or “certainly not manage”) they will manage their money in the future. One would expect that students with a higher perceived knowledge level would, all else equal, be more willing to take chances with their investment decisions. Our findings support this, as both US and Chinese students with perceived high levels of knowledge scored higher on the risk assessment than those that had perceived lower levels. The difference between the US and Chinese values is insignificant for those that had high knowledge, but Chinese students with low knowledge rated higher than their American counterparts. Surprisingly though, those students with a high perceived level of knowledge were not more accurate in selecting a risk tolerance that matched the more robust risk tolerance assessment score. This suggests that, particularly for US students, they tended to perceive their knowledge as higher than it actually is.

One would also expect that students that believe they would manage their future funds would rate more aggressively than those that do not; however, we only find this to be true for the American



sample. Chinese students that do not plan to manage their own funds scored higher than those that do plan to manage their own investments. Once again, we find that the US sample predicts their risk tolerance more accurately, although the differences are only significant for those samples where the students believe they have low knowledge and plan to manage their own money.

Taken as a whole, the primary conclusions we draw from the statistics presented in Table 4 are that Chinese students rate higher in risk tolerance very nearly across the board; however, American students seem to be more capable of actually predicting their risk tolerance. Thus, when combined with the summary statistics from Table 3, one could project these findings are a result of either Chinese students being more risk averse than they believe, at least relative to their American counterparts, or, consistent with our earlier findings, a result of having a relative lack of knowledge to implement their actual tolerance into portfolio selections. However, to really draw these conclusions, we now turn to more robust statistical techniques to further examine these possibilities.

### 6.3. Multivariate results

To further explore the results in a multivariate context, we begin our analysis by employing a logistic framework. Specifically, we implement the following model:

$$\begin{aligned} Dep = & \alpha + \beta_1 \text{Chinese} + \beta_2 \text{Female} + \beta_3 \text{ParentLowEd} \\ & + \beta_4 \text{ParentHighEd} + \beta_5 \text{HighIncome} \\ & + \beta_6 \text{LowIncome} + \beta_7 \text{IntroFINC} + \beta_8 \text{InvCourse} \\ & + \beta_9 \text{Check} + \beta_{10} \text{Bonds} + \beta_{11} \text{Stock} \\ & + \beta_{12} \text{ManageNo} + \beta_{13} \text{KnowledgeHigh} \\ & + \beta \text{SchoolYear} + \varepsilon. \end{aligned}$$

where *Dep* is either *HigherTolBelief* (Model 1), *HigherTol* (Model 2), or *RiskTolMatch* (Model 3). *HigherTolBelief* is a dummy variable equal to 1 if the student respondents felt they were either “aggressive” or “moderately aggressive”, zero otherwise. *HigherTol* is a dummy variable equal to 1 if the student respondent scored above a 28 on the risk tolerance assessment, which corresponds to an “above average” or “high” tolerance for risk. *RiskTolMatch* is a dummy variable equal to 1 if the student’s chosen risk tolerance matches his/her qualitative classification from the tolerance assessment test, zero otherwise.

*Chinese* is a dummy variable equal to 1 for the Chinese students in the sample, zero otherwise, and it is the primary variable of interest. *Female* is a dummy variable equal to 1 if the respondent is a female, zero otherwise. *SchoolYear* is a series of dummy variables equal to one to control for the students class, from freshman to graduate student. The results of these variables are excluded for brevity. All other variables are as defined previously.

Our working hypothesis is that Chinese individuals are more risk tolerant than their US counterparts, due in large part to the collectivistic culture they embrace. Thus, we would expect a positive coefficient on the *Chinese* variable in Models (1) and (2). Our bivariate analysis suggests that American students are more accurate with their estimates of their risk tolerance. This would lead to a suggested negative coefficient on the *Chinese* variable in Model (3).

Numerous studies, including Sundén and Surette (1998), Barber and Odean (2001), Watson and McNaughton (2007), Statman and Weng (2008), and Pan and Statman (2012), find that males typically hold riskier portfolios than females, thus we would expect a negative coefficient on *Female* in Models (1) and (2). We are agnostic to the expected sign for *Female* in relation to *RiskTolMatch* in Model (3).

The predicted sign for *HighIncome* is positive for Models (1) and (2), as our conjecture is that students that have been accustomed to high levels of wealth are more willing to take risk with resources and/or are more knowledgeable about the risk/reward tradeoff. Further, Sung and Hanna (1996) and Grable and Lytton (1998) find a positive relationship between economic resources and tolerance. The opposite is true for *LowIncome*. The same relations are expected for *ParentHighEd* and *ParentLowEd*, potentially due to a positive correlation between education and income, as well as education and financial acuity.

*IntroFinc* and *InvCourse* are expected to have positive influences in all three models, as students educated in financial-related topics are more likely to understand the reward for taking risk, given they more fully understand market dynamics. It would also be logical to expect the academic experience to manifest in a positive influence on the student's ability to match their risk preference to their risk assessment. *Check*, *Bonds*, and *Stocks* all control for financial experience, and they each have predicted positive signs in each of the three Models. *ManageNo* and *KnowledgeHigh* are included in the models as the minority response in the total sample. The prediction is that *ManageNo* would negatively affect *HigherTolBelief* and *HigherTol*, while *KnowledgeHigh* would likely positively influence the two dependent variables. *KnowledgeHigh* should positively influence *RiskTolMatch*, while *ManageNo* would suggest a lack of interest or perceived ability that could negatively influence *RiskTolMatch*.

The results of these analyses are presented in Table 5. We first examine the influences that predict *HigherTolBelief* (Model 1) and *HigherTol* (Model 2). The first observation of note is that many control variables significantly predict perceived risk tolerance or assessed risk tolerance individually, but few are significantly predictive of both. For example, we find that students who believe they have a high knowledge level and have taken an investment course *feel* they are more willing to take risk; however, those significant relations do not actually manifest in higher risk tolerance according to the assessment quiz. We do find; however, a consistent negative coefficient on *Female*, which supports the well-documented contention that females are more reluctant to take risk.

Table 5.

Logit models: Tolerance levels. The following table presents results from logistic models with binary variables *HigherTolBelief*, *HigherTol*, and *RiskTolMatch* as independent variables. *HigherTolBelief* is a dummy equal to one if the respondents felt they either were "aggressive" or "moderately aggressive" in their investment preference, zero otherwise. *HigherTol* is a dummy variable equal to one if the respondent scored in excess of 28 on the risk tolerance assessment (which indicates an "above average" or "high" tolerance for risk). *RiskTolMatch* is a dummy variable equal to one if the student's score on the risk tolerance assessment matches their belief of their risk tolerance, zero otherwise. *Chinese* is a dummy variable equal to 1 if the student respondent was Chinese, zero if they were American. All other variables are as defined in Table 1.

	(1)		(2)		(3)	
	HigherTolBelief		HigherTol		RiskTolMatch	
	Coef	Pr>Chi2	Coef	Pr>Chi2	Coef	Pr>Chi2
<b>Intercept</b>	-0.72	0.2043	-1.41	0.0126**	1.27	0.0288**
<b>Chinese</b>	0.94	0.0186**	1.45	0.0003***	-1.09	0.0090***
<b>Female</b>	-0.71	0.0000***	-0.53	0.0010***	0.41	0.0128**
<b>ParentLowEd</b>	0.48	0.0307**	-0.08	0.7221	0.29	0.1878
<b>ParentHighEd</b>	-0.43	0.1518	0.11	0.7042	0.04	0.8851
<b>HighIncome</b>	-0.52	0.0447**	0.07	0.0802*	-0.41	0.1268
<b>LowIncome</b>	-0.59	0.0075***	-0.34	0.1122	0.07	0.7571
<b>IntroFINC</b>	-0.13	0.5760	0.36	0.1341	0.28	0.2491
<b>InvCourse</b>	0.34	0.0748*	0.29	0.1288	-0.25	0.1955
<b>Check</b>	0.03	0.8907	0.08	0.7267	-0.35	0.1472
<b>Bonds</b>	0.31	0.3048	0.50	0.0950*	-0.26	0.3999
<b>Stock</b>	0.24	0.3505	0.20	0.4275	-0.54	0.0333**
<b>ManageNo</b>	-0.26	0.3355	-0.05	0.8638	-0.09	0.7357
<b>KnowledgeHigh</b>	0.80	0.0007***	0.18	0.4060	0.11	0.6460
<b>N</b>	829		829		829	
<b>%Concordant</b>	66.6		63.3		60.4	

\*Significance at the 10% level.

\*\*Significance at the 5% level.

\*\*\*Significance at the 1% level.

The most notable finding applies to the *Chinese* variable. We find that Chinese students feel they have higher risk tolerance *and* also score significantly higher on the tolerance assessment. The second is consistent with the bivariate analysis, while the first finds significance where it was lacking in the summary statistics. The significance levels are at the 5% and 1% levels, respectively. Further, in Model (3), we find, consistent with our bivariate results, that Chinese students are less accurate in their predictions of their risk tolerance. Females, on the other hand, are more accurate in their predictions. Thus, collectively, the results of Table 5 suggest that Chinese students perceive themselves to be more risk tolerant, but often do not actually score as such.

For robustness, we next turn to the following ordinary least squares regression model, with results presented in Table 6:

$$\begin{aligned}
 Dep = & \alpha + \beta_1 \text{Chinese} + \beta_2 \text{Female} + \beta_3 \text{ParentLowEd} \\
 & + \beta_4 \text{ParentHighEd} + \beta_5 \text{HighIncome} \\
 & + \beta_6 \text{LowIncome} + \beta_7 \text{IntroFINC} + \beta_8 \text{InvCourse} \\
 & + \beta_9 \text{Check} + \beta_{10} \text{Bonds} + \beta_{11} \text{Stock} \\
 & + \beta_{12} \text{ManageNo} + \beta_{13} \text{KnowledgeHigh} \\
 & + \beta_{14} \text{SchoolYear} + \varepsilon.
 \end{aligned}$$

We examine five different dependent variables. Model 1 examines the significant influences of the risk tolerance assessment score (*RiskTolScore*). We find Chinese students have higher risk tolerance scores, while females have lower scores. *LowIncome* students have lower tolerance, while those students that have had an investment course score higher on the assessment. All of these results are as expected.

**Table 6.**

OLS models: Risk levels. The following table presents results from OLS models predicting risk tolerance scores and risk of chosen portfolios. *RiskTolScore* is the score achieved by the respondent on the assessment tool, as developed by Grable and Lytton (1999). *StDev* is the standard deviation of the respondent's chosen investment allocation. *Sharpe* is the sharpe ratio for the respondent's chosen asset allocation, calculated as the expected return minus the risk-free rate of return, then divided by the portfolio's standard deviation. *StDevAdj* is the calculated *StDev* divided by the standard deviation of an equally weighted portfolio (of large cap equities, small cap equities, corporate bonds, government bonds, international equities, and money market instruments) in the respective country. This is designed to help control for the systematic difference in risk levels of portfolios chosen in the two separate countries. *SharpeAdj* is the calculated Sharpe ratio divided by the Sharpe ratio for an equally weighted portfolio in each country. *Chinese* is a dummy variable equal to 1 if the student respondent was Chinese, zero if they were American. All other variables are as defined in Table 1.

	(1)		(2)		(3)		(4)		(5)	
	<b>RiskTolScore</b>		<b>StDev</b>		<b>Sharpe</b>		<b>StDevAdj</b>		<b>SharpeAdj.</b>	
	<b>Coef</b>	<b>pp-val</b>	<b>Coef</b>	<b>pp-val</b>	<b>Coef</b>	<b>pp-val</b>	<b>Coef</b>	<b>pp-val</b>	<b>Coef</b>	<b>pp-val</b>
<b>Intercept</b>	25.00	0.0000***	6.30	0.0010***	0.34	0.0000***	0.50	0.0001***	0.84	0.0000***
<b>Chinese</b>	3.46	0.0000***	-1.08	0.4164	0.15	0.0000***	-0.10	0.2791	-0.08	0.1421
<b>Female</b>	-1.68	0.0000***	-1.63	0.0037***	0.01	0.5420	-0.13	0.0013***	0.01	0.6244
<b>ParentLowEd</b>	0.43	0.3352	1.15	0.1228	0.04	0.0275**	0.09	0.0978*	0.07	0.0234**
<b>ParentHighEd</b>	0.34	0.5729	0.11	0.9168	-0.02	0.5251	0.01	0.9187	-0.03	0.5100
<b>HighIncome</b>	0.31	0.5564	-0.17	0.8510	0.02	0.3500	-0.01	0.8389	0.04	0.3137

	(1)		(2)		(3)		(4)		(5)	
	RiskTolScore		StDev		Sharpe		StDevAdj		SharpeAdj.	
	Coef	pp-val	Coef	pp-val	Coef	pp-val	Coef	pp-val	Coef	pp-val
<b>LowIncome</b>	-0.76	0.0865*	0.42	0.5716	-0.01	0.5373	0.03	0.6038	-0.02	0.4909
<b>IntroFINC</b>	0.12	0.8092	0.72	0.3755	0.06	0.0077***	0.05	0.3628	0.09	0.0078***
<b>InvCourse</b>	0.72	0.0676*	0.56	0.3958	-0.01	0.6891	0.04	0.4105	-0.01	0.7322
<b>Check</b>	0.55	0.2375	0.93	0.2381	0.02	0.2491	0.06	0.2390	0.04	0.2631
<b>Bonds</b>	1.07	0.0793*	0.09	0.9293	-0.01	0.6466	0.00	0.9460	-0.02	0.6470
<b>Stock</b>	0.39	0.4371	1.75	0.0388**	-0.00	0.9279	0.13	0.0228**	0.00	0.9613
<b>ManageNo</b>	0.41	0.4500	0.18	0.8436	-0.02	0.3681	0.02	0.7952	-0.03	0.4071
<b>KnowledgeHigh</b>	0.45	0.3272	0.68	0.3724	0.01	0.5031	0.06	0.2973	0.02	0.4645
<b>N</b>	829		829		829		829		829	
<b>Adj. R2</b>	0.0593		0.0737		0.1573		0.0906		0.0165	

\*Significance at the 10% level.

\*\*Significance at the 5% level.

\*\*\*Significance at the 1% level.

Model 2 examines the students' portfolio standard deviations, as calculated from their chosen asset allocations and historical data from each asset class. The coefficient on *Chinese* is negative, but insignificant at any standard measurement of significance. This contrasts with our third hypothesis as we find no evidence that Chinese students have higher risk portfolios, even though they both perceive themselves and assess as being higher risk tolerant. The control variables that have the most significant influences are *Female* (negative) and *Stock* (positive), both of which are as we would expect.

In Model 3, we find that Chinese students have higher Sharpe ratios, indicating more efficiency in their asset selections relative to their American counterparts. We find that students that have taken a finance class have higher Sharpe ratios, consistent with the notion that a basic education in risk and return is valuable. Also of interest is that gender does not affect this dependent variable, suggesting that the previous findings that females are more risk averse is just that, rather than some differing level of understanding.

As previously discussed, the different levels of returns and risk levels in the asset classes between American and China could easily influence the results. Thus, we also run the analysis on the two adjusted variables (*StDevAdj* and *SharpeAdj*) in Models 4 and 5. The results when predicting

*StDevAdj* are unchanged in relation to the primary variable of interest. However, when controlling for the relative levels, we find the significance of *Chinese* on the Sharpe ratio of the portfolios disappears, suggesting that, relative to the average portfolio in each country, the two subsamples choose portfolios that are statistically equally efficient.

## 7. Conclusion

Using a unique sample of survey data from Chinese and American students, we find that Chinese students generally are more risk tolerant than their American counterparts, both when assessed with a questionnaire and when self-assessing. This notion is consistent with the cushioning hypothesis, which contends that cultures with collectivistic societies are more risk tolerant than those with individualistic attitudes. However, when asked to complete a portfolio allocation, the elevated risk tolerance of the Chinese does not materialize in higher risk portfolios. Rather, we find an insignificant difference in chosen portfolio risk between the two groups. Given that we also find that Chinese students are less capable of predicting their risk tolerance levels than American students, our results provide evidence consistent with Fan and Xiao (2006), who contend that Chinese are generally less aware of financial market dynamics. Moreover, given that recent returns—relative to the period of study—in China have been stronger than in the US, our results are likely more robust than even suggested, as these returns should have induced a higher investment in equities (not lower) by the Chinese students.

The question of why this disconnect between tolerance and behavior exists is one for future study. Nonetheless, we can posit a combination of some potential influences. First, the relative youth of the Chinese investment system—particularly the access of the average Chinese citizen to this system—could be a major determining influence. In America, the majority of university students have at least a passing familiarity with the concept of investing, having learned of it from generations before them. This is perhaps not yet true in China. In addition, the influence of governmental bodies differs between the two cultures. Chinese citizens generally place a large level of confidence in government and the role it plays in their financial plans. We submit that this could lead to a disproportionate allocation to government-controlled assets, relative to that ideally deemed by their chosen risk tolerance. To test these hypotheses, one would have to extend the study questions to include those of motivation and background knowledge of investment activities, which would perhaps provide a fertile field for future research.

Our study adds to the literature examining the influence of culture on investment behavior and should prove of interest in a variety of contexts. First, in an investment environment that is increasingly globalized, practicing financial advisors should be aware of how one's cultural background can influence investing desires—both their own and those of their clients. Combined with the increasingly complex landscape of financial markets, this can create both an opportunity and a potential trap for managers as they seek to create portfolios that match their clients' objectives.

Studies of this nature should also be of interest to those in the academic world that regularly teach students that are just beginning to develop an understanding of how they plan to manage their future investments. Academic researchers could use differing cultural impacts as a springboard to

consider revisiting what is meant by notions such as portfolio theory and optional portfolio creation. Any study that has at its core an examination of behavioral influences on market activities should keep in mind that a significant percentage of the investing body may be operating under a different set of cultural influences.

It is worth noting that studies using students as the sample have inherent issues when one attempts to expand results to describe the larger financial marketplace. Specifically, the students in the sample are very likely neither financially independent nor professional investors. As such, their perception of their investment activities may indeed differ from reality when they are doing so for the purpose of financial stability and advancement. An ideal extension—and alternative analysis—of the issues raised in this study would include data from individuals who already actively invest. Further, examining investment activities in an ongoing manner (rather than a static portfolio allocation selection) would undoubtedly shed light on the interlacing issues of culture, risk tolerance, and investment activity. A robust dataset of investment activity during different periods of a financial market cycle could allow the researcher to examine how investors alter their portfolio given changing conditions. This, when examined in conjunction with risk tolerance and the cultural background of the participant, would greatly extend the examination of the hypotheses developed in this study

## Appendix. Survey

### Investment Survey

By completing this survey, you agree that the information provided may be used for purposes of an academic study. Completion is voluntary.

#### Part A: Individual Data

Current Date \_\_\_\_\_ University \_\_\_\_\_

Nationality \_\_\_\_\_

Hometown [city, state, country] \_\_\_\_\_

Please indicate your current college classification:

- ☐ Freshman
- ☐ Sophomore
- ☐ Junior
- ☐ Senior

Please indicate your gender:

- ☐ Male
- ☐ Female

Please identify your major: \_\_\_\_\_

Please indicate the level of education completed by your father and mother:

- | <u>Father</u>   | <u>Mother</u>   |
|---|---|
| <input type="checkbox"/> Less than High School Degree | <input type="checkbox"/> Less than High School Degree |
| <input type="checkbox"/> High School Degree           | <input type="checkbox"/> High School Degree           |
| <input type="checkbox"/> Undergraduate Degree         | <input type="checkbox"/> Undergraduate Degree         |
| <input type="checkbox"/> Master's Degree              | <input type="checkbox"/> Master's Degree              |
| <input type="checkbox"/> Doctorate Degree             | <input type="checkbox"/> Doctorate Degree             |

Please indicate the range of your parents combined annual income:

- ☐ less than \$20,000
- ☐ between \$20,000 and \$50,000
- ☐ between \$50,000 and \$100,000
- ☐ between \$100,000 and \$250,000
- ☐ over \$250,000

Have you taken an introductory Finance course at the College level?

- ☐ Yes
- ☐ No

Please list any other Finance courses (beyond the introductory course) that you have taken or are currently taking:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Please check the type (all that apply) of accounts/investments you presently or have previously owned:

- ☐ Checking, Savings, or Money Market
- ☐ Bonds (individual or as part of mutual fund)
- ☐ Stocks (individual or as part of mutual fund)

#### Part B. Personal Risk Tolerance Perception

Please indicate your current belief regarding managing your money in the future.

- ☐ I will certainly manage my own investments
- ☐ I am likely to manage my own investments
- ☐ I am unlikely to manage my own investments
- ☐ I will certainly not manage my own investments

I consider my knowledge of investments to be:

- ☐ Very high
- ☐ Somewhat high
- ☐ Somewhat low
- ☐ Very low

Please assess yourself (by checking **one** of the following) with regard to taking on risk:

- ☐ Aggressive
- ☐ Moderately Aggressive
- ☐ Conservative
- ☐ Moderately Conservative

Please indicate the percentage (%) of each of the following investment types that you would hold in an ideal retirement portfolio (percentages must add to 100%):

- ☐ Money market (or savings account)
- ☐ Government bonds
- ☐ Corporate bonds
- ☐ Large capitalization US Stocks
- ☐ Small capitalization US Stocks
- ☐ International Stocks



*Part C. Risk tolerance quiz*

Source: Grable, J.E., Lytton, R.H., 1999. Financial risk tolerance revisited: The development of a risk assessment instrument. *Financ. Serv. Rev.* 8, 163–181.

1. In general, how would your best friend describe you as a risk taker?
  - a. A real gambler
  - b. Willing to take risks after completing adequate research
  - c. Cautious
  - d. A real risk avoider
2. You are on a TV game show and can choose one of the following. Which would you take?
  - a. \$1000 in cash
  - b. A 50% chance at winning \$5000
  - c. A 25% chance of winning \$10,000
  - d. A 5% chance at winning \$100,000
3. You have just finished saving for a “once-in-a-lifetime” vacation. Three weeks before you plan to leave, you lose your job. You would:
  - a. Cancel the vacation
  - b. Take a much more modest vacation
  - c. Go as scheduled, reasoning that you need the time to prepare for a job search
  - d. Extend your vacation, because this might be your last chance to go first-class.
4. If you unexpectedly received \$20,000 to invest, what would you do?
  - a. Deposit it in a bank account, money market account, or an insured CD
  - b. Invest it in safe high quality bonds or bond mutual funds
  - c. Invest it in stocks or stock mutual funds
5. In terms of experience, how comfortable are you investing in stocks or mutual funds?
  - a. Not at all comfortable
  - b. Somewhat comfortable
  - c. Very comfortable
6. When you think of the word “risk” which of the following words come to mind first?
  - a. Loss

- b. Uncertainty
- c. Opportunity
- d. Thrill

7. Some experts are predicting prices of assets such as gold, jewels, collectibles, and real estate (hard assets) to increase in value; bond prices may fall, however, experts tend to agree that government bonds are relatively safe. Most of your investment assets are now in high interest government bonds. What would you do?

- a. Hold the bonds
- b. Sell the bonds, put half the proceeds into money market accounts, and the other half into hard assets.
- c. Sell the bonds and put the total proceeds into hard assets.
- d. Sell the bonds, put all the money into hard assets, and borrow additional money to buy more.

8. Given the best and worst case returns of the four investment choices below, which would you prefer?

- a. \$200 gain best case; \$0 gain/loss worst case
- b. \$800 gain best case; \$200 loss worst case
- c. \$2600 gain best case; \$800 loss worst case
- d. \$4800 gain best case; \$2400 loss worst case

9. In addition to whatever you own, you have been given \$1000. You are now asked to choose between:

- a. A sure loss of \$500
- b. A 50% chance to lose \$1000 and a 50% chance to lose nothing.

10. In addition to whatever you own, you have been given \$2000. You are now asked to choose between:

- a. A sure loss of \$500
- b. A 50% chance to lose \$1000 and a 50% chance to lose nothing.

11. Suppose a relative left you an inheritance of \$100,000, stipulating in the will that you invest ALL the money in ONE of the following choices. Which would you select?

- a. A savings account or money market mutual fund
- b. A mutual fund that owns stocks and bonds
- c. A portfolio of 15 common stocks

d. Commodities like gold, silver, and oil

12. If you had to invest \$20,000, which of the following investment choices would you find the most appealing?

a. 60% in low-risk investments, 30% in medium-risk investments, and 10% in high-risk investments

b. 30% in low-risk investments, 40% in medium-risk investments, and 30% in high-risk investments

c. 10% in low-risk investments, 40% in medium-risk investments, and 50% in high-risk investments.

13. Your trusted friend and neighbor, an experienced geologist, is putting together a group of investors to fund an exploratory gold mining venture. The venture could pay back 50 to 100 times the investment if successful. If the mine is a bust, the entire investment is worthless. Your friend estimates the chance of success is only 20%. If you had the money, how much would you invest?

a. Nothing

b. One month's salary

c. Three month's salary

d. Six month's salary

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## Footnotes

1 Since the majority of the Chinese student sample does not speak English, the same survey was translated (by two native speakers) into Chinese for administration in the Chinese Universities. In this process, considerable care was given to ensure the questions were relevant to those participants (e.g., using Chinese Yuan as the currency instead of the US Dollar). The complete Chinese version of the survey is available upon request.

2 In order to examine whether the difference in age and academic experience biases our results, we also complete all analyses on a subset of the sample that includes only juniors and seniors. The primary results associated with this smaller sample are generally consistent with those reported and are available upon request. We thank an anonymous reviewer for suggesting this robustness check.

3 For robustness, we explore multiple data definitions. For example, we use the iShares S&P Global 100 Index for the international index for Chinese investors, and we also use matching time periods for US and China data (i.e., only more recent years). In all cases, our results are robust to the varying index definitions.