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# Financial Risk Tolerance Among Same-sex and Mixed-sex Couples

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This paper investigates the willingness to take financial risks among same-sex and mixed-sex couples. Using cross-sectional data from Survey of Consumer Finances, I employed multivariate and fixed-effect probability regression models and find a higher level of self-reported financial risk tolerance among gay couples as compared to heterosexual couples and lesbian couples. Risk tolerance difference in actual investment behaviors, including participation in stock and bond market and percentage of liquid assets invested in stocks, were not statistically significant.

## 1. Introduction

Recent waves of feminist movements have sparked public awareness of underrepresentation of women in high-paying professions, with Finance being one of the worst cases. According to CFA Institute's official report on gender diversity, only about 18% of CFA members are female, revealing an even lower representation than 26% in STEM fields (Fender, et al). Despite the apparent lack of diversity, some also consider the gender imbalance to be a waste of potential not only for women themselves, but also for employers and companies: an equal gender representation has the potential to mitigate male risk preferences, considering women's higher risk aversion, especially under stress (Mather and Nichole).

The gender difference in financial risk-taking behavior is supported by overwhelming evidence in Economics literature. Dwyer and his colleagues found female investors exhibit less risk-taking in their largest and riskiest mutual fund investment decisions than their male counterpart, though the gender gap was significantly weakened when controlled for financial knowledge (Dwyer et al, 2002). Another study took account of the publishing bias and still consistently found women to have a lower investment level and therefore higher risk aversion, even when the majority of data were not originally collected to study gender differences (Charness and Gneezy, 2012).

However, most studies on the intersection of gender and financial risk taking behaviors only attempt to investigate its effect on individual level, while important financial decisions are often made under collective effort, especially in financial institutions. Therefore, it raises the question that if the gender effect will persist when multiple decision makers are present: will communication mitigate the gender effect, or instead intensify it? Considering the difficulty of obtaining a large enough sample size with financial risk characteristics associated with larger groups, this research question primarily focuses on the household setting: in particular, if same-sex couples are willing to take the same level of financial risk as heterosexual couples. The hypothesis is that, if individual gender effect does persist in a household setting, then gay couples would be more financially risk tolerant than heterosexual couples, and lesbian couples would be the least tolerant due to a decreasing involvement of male decision makers.

In last decade, there has been a boom in research on domestic economics of homosexual households. However, since there are only 5.56 same-sex couples per 1,000 households, are qualitative studies with a narrowly limited sample size (LGBT Demographic Data Interactive). An interview of 22 participants concludes that same-sex couples are more likely to keep their finances separate than heterosexual couples (Burns et al 2018). While the financial decision-making was described as a “fair, joint and negotiated process”, it seems that the higher earner usually has the last word and most of the decision-making power.

On the contrary, the income effect appears to be flipped by gender in heterosexual couples: a higher non-labor income increases men’s share but decreases women’s share in the management of household finances. The income effect on household financial control suggests that families of different economic conditions might have high variety in financial decision-making process. The unavailability of data measuring such process may complicate the regression results, failing to control its effect on risk aversion. Though about 70% of respondents reported both to have a final say in big financial decisions, it is also observed that men would usually possess the final decision-making power in the rest cases (Dobbelsteen and Kooreman 1997). Despite the absence of gender effect, it is

unlikely to draw useful comparison upon the financial decision-making procedure or its degree of collectiveness among same-sex and mixed sex couples, given the vast difference in research methods and sample design. It is likely that difference in labor division, money management system, and communication mechanism also drives the disparities in financial risk tolerance, potentially exaggerating the sex composition effect in later analysis.

A couple of other socioeconomic factors are suggested to have an effect on financial risk tolerance, though sometimes conflicted results were found on their exact effect. Higher age, income, economic expectation, attained education, married status are suggested to associate with greater financial risk tolerance (Grable 2000). A later analysis using SCF panel data confirms the general effect of increased education and income, though the age effect was found to be in opposite direction (Yao and Sherman 2005). An empirical study also suggests that the age effect on financial risk tolerance might be non-linear (Hallahan et al, 2004).

In this paper, I will follow the setup from *Depression babies: do macroeconomic experiences affect risk taking?* Due to recent changes in SCF survey, new variables of self-reported willingness to take financial risks will be constructed. However, I will adopt the rest three measures of financial risk tolerance in actual investment behaviors introduced in the paper, including stock market participation, bond market participation, and proportion of liquid assets invested in stocks (Malmendier et al, 2011).

## **2. Data**

### *2.1 Survey of Consumer Finances*

Data used in this study comes from the Survey of Consumer Finances, a triennial cross-sectional survey sponsored by the Federal Reserve Board in cooperation with the the Statistics of Income Division of the Internal Revenue Service. SCF is established primarily as a study of household wealth and use of financial services and is widely used in social study research. SCF collects information on household income, debts, and demographic

characteristics with measures on detailed components of assets and liabilities.

Participation in SCF is voluntary and about 4,500 to 6,500 households were interviewed each year. Its sample size and nationwide scheme is especially desired in this comparison between same-sex and mixed-sex couples. Given the naturally small percentage of homosexual individuals in any general population, a large sample size is necessary to create a big enough fraction of homosexual representation for any statistically valid outcome. The majority of interviews are face-to-face and the median interview length was approximately eighty minutes in the 2004 survey. SCF participants come from a wide range of background, from teenagers to elders in their nineties. The average age of married couple in the survey is approximately 50. Since the question focus on household financial risk tolerance, I will restrict the sample to people aged 25 to 75 since this age group captures most working population. The restriction is also a simplicity measure, because couples of extreme ages might possess other characteristics that systematically affect their financial risk tolerance but not captured in the data.

Self-reported answers are not guaranteed to be truthful: for example, while the survey investigates household finance, respondents may simply answer according to their own risk preferences without considering partners' behavior. Given the diversity in individual participation in household wealth management, it is also likely that the respondents are not fully informed of the exact size and distribution of household wealth. Therefore, there is no guarantee that the reported value of variables such as the market value of stock mutual fund reflects faithfully reflects the actual amount. However, SCF is almost unique in its scale, length, and detailed focus on economic measures, and therefore should at least provide a useful insight into this research question.

To maintain the scientific validity of the survey, SCF does not substitute respondents for families that choose not to participate. Consequently, if family declines participation, families of their kind may not be represented clearly in the sample, for 6,500 is an extremely small fraction of the U.S. population and each family interviewed therefore becomes very important to the outcome (Kenickell, 2001). As a result, patterns found in this study may not be representative for the general public, since some families may lack representation

in the analysis simply due to nonresponse.

## *2.2 Sample Design*

In order to provide useful information on the full range of wealth, the SCF employs a dual-frame design. Approximately 3/4 of the sample was selected using a standard multi-stage national area-probability model, contributing 4,754 cases to the final set of interviews in the latest 2016 survey ("Codebook for 2001 Survey of Consumer Finances."). This geographically-based random sampling provides good coverage of characteristics, such as home ownership, that are broadly distributed in the general population.

The other 1/4 of the survey cases was selected as a list sample from statistical records derived from tax data. Using a "wealth index" to predict a ranking order by wealth, the list sample disproportionately selects families that are likely to be wealthy (Kenickell, 2001). As a result, the average total family income derived from the 2016 survey sample data turns out to be about a million dollars, more than fifteen fold of the median household income (\$59,039) in the United States in 2016 (Semega et al). Considering the high concentration of household wealth in the US, oversampling of wealthy families gives a more accurate estimate of narrowly held assets that would only be possible in a randomized sample with a much larger sample size. The heavier weight towards the upper end of wealth distribution also helps to correct for bias in nonresponse, as wealthier respondents are much less likely to participate in the survey, possibly due to higher sensitivity about privacy issues (Kennickell, 2008).

## *2.3 Multiple imputations*

To approximate the distribution of missing data due to such perceived sensitivity, SCF has adopted a multiple imputation procedure which yields five values for each missing value since 1989 (Kenickell, 1998). Such imputation may lead to inconsistencies in reported data: for example, total family income is sometimes different from the sum of individual components ("Codebook for 2001 Survey of Consumer Finances.").

While multiple imputed data provide increased efficiency in estimation and enable a more informative overall analysis, replacing real values with imputed values result in smaller

standard errors and therefore p-values. To account for the inflated significance in results, this study uses STATA package SCFCOMBO to incorporate the inherent uncertainty in the procedure. Since the SCF does not follow an equal-probability design, input would be weighted in regression analysis using a weight file containing the final nonresponse-adjusted sampling weights. Since the sample weight captures each observation's probability of being drawn from the general population, the oversampling of high wealth households would also be reversed in analysis.

### 3. Findings

#### 3.1 Multivariate Linear Regression Model: willingness of to take financial risks on a ten-point scale

$$RISK_i = \beta_0 + \beta_1 S_i + \beta_2 E_i + \beta_3 T_i + \beta_4 A_i + \beta_5 A_i^2 + \beta_6 R_i + \beta_7 X_i + \beta_8 K_i + \epsilon_c$$

Our first model includes a numerical variable measuring self-reported financial risk tolerance, recently introduced in the latest 2016 survey. Since participants are asked to rate on a ten point scale, it is safe to assume the difference between adjacent integers to be the same. Therefore, a linear regression model is used because the outcome variable is viewed as a continuum.

To isolate the gender effect, the model should include the household sex composition as well as other independent variables as mentioned in the introduction section. The dependent variable,  $RISK_i$ , is the willingness of family  $i$  to take financial risks on a ten-point scale, with larger number represents a higher degree of willingness. The first explanatory variable  $S_i$  indicates the sexual orientation (and therefore sex composition) of the couple, which is derived from the gender of respondents and their partners. For example, the couple is considered “gay” if both the respondent and his partner are male. Gay couples and Lesbian couples are not categorized together as they actually represent opposite gender diversion from heterosexual couples: a gay couple has one more man and one less woman than a straight couple while the reverse is true for lesbian couples. Therefore, there is no reason to assume the gender effect to be the same.

$E_i$  is the highest educational attainment of the respondent  $i$ , categorized into high school or lower, Associate's Degree, Bachelor, Master, and Doctorate Degree.  $T_i$  is equal

to the log of real total annual income of family  $i$ , which is deduced using consumer price index.  $R_i$  is the race of the respondent  $i$ . While  $A_i$  represents age of the respondent,  $A_i^2$  is the square of age, which is included under the assumption that the age effect might not be linear.  $X_i$  indicates if family  $i$ 's economic expectation is greater, worse, or the same. The last explanatory variable  $K_i$  represents respondent  $i$ 's financial knowledge, which is also plotted on a ten-point scale.  $\epsilon_c$  is the error term.

*Table 1: Linear Model Regression Results: Self-Reported Willingness On a 10-Point Scale (2016 Data Only)*

	Coefficient	Standard Error
Sex Composition		
Gay	0.9637896**	0.4920804
Lesbian	0.3465132	0.4112813
Race		
Black	0.7265457***	0.1383467
Hispanic	0.4022295***	0.1318043
Other races	0.4024453**	0.1907119
Economic Expectation		
Greater	0.4380511***	0.1040217
Worse	-0.0042055	0.1172674
Age		
Age	0.0486747**	0.0240118
Age Squared	-0.000654***	0.0002398
Income (Logged)	0.4816600	0.0545802
Financial Knowledge	0.1568998***	0.0212892

*Notes: \*\*\*Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level. Regression analysis already taken account of multiple imputations. Educational attainment (of the respondent) is also included in regression analysis but omitted in this table.*

The results show that, while lesbian couples do not exhibit significantly different pattern in financial risk tolerance, being both male does have a positive effect on tolerant level.

Race also turns out to be a significant factor of financial risk tolerance, a black



respondent on average rates his willingness about 0.7 points higher than his white counterpart, with other factors controlled. It is also shown that couples become more risk tolerant with greater economic expectation, though they do not necessarily become risk averse when it's worse. In addition, higher total family income is also associated with increased willingness to take financial risk, though the effect does not seem to amplify much as income moves up towards the end of distribution. Though not listed in the table, possessing a degree higher than Associate's Degree is also associated with greater level of financial risk tolerance. The regression results for age and squared age shows that the age effect (of the respondent) is non-linear: households financial risk tolerance is said to be higher with an older age, but increase at a decreasing rate. Last but not least, better financial knowledge increases one's risk tolerance: 1 more point in financial knowledge is expected to raise willingness by 0.15 point.

### *3.2 Linear Probability Model with Fixed Effect: Binary Measure of Amount of Financial Risk Willing To Take*

Considering the limited observations of same-size couples, I expanded the general sample size by incorporating 2013 and 2010 survey data. However, since the previous ten-point-scale question was not available in earlier years of SCF survey, I used a similar question asking about household's willingness to take financial risks, but now only with four possible options instead of a numerical scale:

**Which of the statements on this page comes closest to the amount of financial risk that you (and your {husband/wife/partner}) are willing to take when you save or make investments?**

- A Take substantial financial risks expecting to earn substantial returns
- B Take above average financial risks expecting to earn above average returns
- C Take average financial risks expecting to earn average returns
- D Not willing to take any financial risks

Because the answers are now categorical, there is no reason to still assume the

difference between each option to be equal. As a result, I divide the four options further into two categories and therefore generate a binary outcome variable:  $RISKY_i$ , which is set to be equal to 1 when the couple are willing to take substantial or above average financial risks and 0 otherwise. Hereafter, coefficients translate into associated probability for the couple  $i$  to be in one of the two categories rather than a numerical value. The full linear probability regression with fixed effect is:

$$RISKY_i = \beta_0 + \beta_1 S_i + \beta_2 E_i + \beta_3 T_i + \beta_4 A_i + \beta_5 A_i^2 + \beta_6 R_i + \beta_7 X_i + \beta_8 T_t + \epsilon_c$$

Despite the addition of the survey year variable  $T_t$ , all other explanatory variables are essentially kept the same, with the exception of financial knowledge  $K_i$  being unavailable for previous years of survey (and therefore not included in this model).

*Table 2: Linear Probability Model Regression Results: Binary Self-Reported Financial Risk Measure*

Dependent \ Outcome	RISKY	RISKY	RISKPART	RISKPART
Variable	(3 years)	(2016)	(3 years)	(2016)
Gay	0.1207456** (0.0474250)	0.2192407*** (0.0820714)	0.0515989 (0.0525652)	0.0593197 (0.0857286)
Lesbian	-0.0087344 (0.0449751)	0.0029790 (0.0684830)	-.0596316 (0.0498497)	-0.1038317 (.0715346)

*Notes: \*\*\*Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level. Regression analysis already took account of multiple imputations. Other dependent variables are included in regression but omitted in this table, including survey year, highest educational attainment (of the respondent), age and age squared (of the respondent), logged real total family income, race (of the respondent), and economic expectations.*

Consistent with previous findings, gay couple expresses a significantly higher risk tolerance: gay couples are about 10% more likely to be willing to take substantial or above average financial risks than heterosexual couples. Coefficients of sex composition in 2016 is also included in table 2 for reference, showing that the gender effect does not vary much among years.

The result of being a gay couple is more significant in combined study than in both the previous model and individual year analysis, possibly as a result of larger sample size. However, the significance level might also be inflated simply due to removal of the

financial knowledge variable, a factor proven to significantly increase one's willingness to take financial risks in the previous model.

Considering the artificial division of categories in this binary outcome is more or less arbitrary, I added another binary outcome RISKPART, which is set to 1 when the respondent reporting willing to take any level of financial risks, and 0 when no risk is preferred. As shown in the table, the coefficients and significance changed with a different definition of the binary outcome variable: though not statistically significant, the new binary shows that lesbian couples are much less likely to report as willing to take any level of financial risks, while gay couples are almost the same as compared to heterosexual couples. The matching signs of coefficients between two binary variables illustrate a positive relationship between increasing male decision-makers to higher reported financial risk tolerance, though the magnitude of such effect depends on the exact measure of financial risk tolerance.

### *3.3 Linear Probability Model with Fixed Effect: Binary Stock and Bond Market Participation*

One of the biggest risks in using self-reported estimates is failing to reflect respondents' actual behaviors. Just like drunk people often fail to recognize their intoxication, individuals with seemingly extreme tendencies might still perceive such behaviors as normal or average. In this case, it is perfectly possible that respondents misjudge their financial risk tolerance due to a lack of comparison, or simply fail to take their partners' tendency into consideration.

To control for such inaccuracy, several models are constructed using actual investment decisions as proxies for financial risk tolerance. On one hand, establishing a universal standard for collective investment behaviors enables these measures to automatically capture the household financial risk tolerance. On the other hand, actual investment decision-making inevitably involves considerations of realistic factors other than one's own financial risk tolerance. For example, taxations on investment returns mean that underinvestment might, on average, be the optimal choice since a positive return is necessary to actually break even. The existence of financial advisory also complicates

investment behaviors, since it arguably involves decision makers outside the household, even though decisions were usually made after intense communication. Therefore, conclusions should only be made after combining results from these models.

Given these concerns, I ran a regression on each behavioral measures of financial risk tolerance and the two self-reported risk binaries, RISKY and RISKPART. As shown in the following table, higher self-reported willingness to take financial risks is highly associated with stock market and bond market participation, and a larger proportion of liquid asset held as stocks. Such strong correlation proves these investment measures to be potentially insightful in revealing financial risk tolerance, despite their own limitations. The first two behavioral estimates are binary variables, concerning if households hold any risky assets, namely stocks and bonds. Regressions using stock and bond market participation as measures of household financial risk tolerance would be combined with the last model and shown in table 4.

*Table 3: Self-Reported and Behavioral Measures of Financial Risk Tolerance*

Dependent \ Outcome Variable	Stock Market Participation	Bond Market Participation	Proportion of Liquid Assets as Stocks
RISKY	0.0798273*** (0.0086263)	0.0156776* (0.0085188)	0.0580691*** (0.0059629)
RISKPART	0.0809195*** (0.0077746)	0.0454038*** (0.0076744)	0.0666604*** (0.0054241)

*Notes: \*\*\*Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level. Regression analysis already took account of multiple imputations. Other dependent variables are included in regression but omitted in this table, including survey year, highest educational attainment (of the respondent), age and age squared (of the respondent), logged real total family income, race (of the respondent), and economic expectations. Regression uses data from 2010, 2013, and 2016 SCF survey.*

### *3.4 Multivariate Linear Regression Model: The Proportion of Liquid Assets Invested In Stock*

In addition to binary participation in riskier investment, this last model looks at financial risk tolerance through the degree of such participation: the proportion of wealth invested in risky assets. In this case, the percentage of liquid asset invested in stocks could be constructed using SCF data. By definition, liquid assets include stocks, bonds, cash and

short-term instruments (checking and savings accounts, money market mutual funds, and certificates of deposit).

While other variables were captured in the SCF survey, the value of cash (and online cash account, like Paypal) is not reported unless it constitutes one of the most valuable type among "miscellaneous assets and debts". Admittedly, cash is usually held in small amounts as compared to savings or investment accounts, but failure to report its value might still skew the analysis due to negligence of the "unbanked" population, whose wealth would be more concentrated in physical forms. According to FDIC's biennial *National Survey of Unbanked and Underbanked Households*, about 6.5% U.S. households in 2017 do not have a checking or savings account, and the proportion is even bigger in previous years (2018). Furthermore, the "unbanked" phenomenon is also associated with other socioeconomic factors: a study of U.S. immigrants shows that having less education, living in poverty, or coming from a larger family are all related to higher probability of being "unbanked" (Rhine 2006).

Since Dwyer's study mentions gender difference in mutual fund investments, I will also include the equity share of mutual funds, deduced from the type of mutual funds held and their market value. Because only less than 5% of the sample reports to invest in mutual funds, the sample size would be too small if equity share is listed as a separate outcome variable. Therefore, combining the equity share, the proportion of liquid assets invested in stock given SCF data would be defined as:

$$\frac{\text{stocks} + \text{stock mutual funds}}{\text{stocks} + \text{bonds} + \text{checking and savings accounts} + \text{deposits} + \text{mutual funds}}$$

The outcome, as a percentage term, will automatically include the factor of stock market participation without dropping any observations, since households do not invest in stocks or stock mutual funds will have a proportion of 0%. The regression results, combined with other four outcome measures of financial risk tolerance, are listed as follows:

*Table 4: Combined Table with Different Measures of Financial Risk Tolerance*

Dependent Variable	Self- Reported RISKY Binary	Self- Reported RISKPART	Stock Market Participation	Bond Market Participation	Proportion of Liquid Assets as Stocks
Gay	0.1207456** (0.0474250)	0.0515989 (0.0525652)	-0.0344809 (0.0423922)	-0.0908558** (0.0417031)	0.0130705 (0.0291617)
Lesbian	-0.0087344 (0.0449751)	-0.0596316 (0.0498497)	-0.0794019** (0.0402023)	-0.0525286 (0.0395488)	-0.0120195 (0.0276947)

*Notes: \*\*\*Significant at the 1 percent level. \*\* Significant at the 5 percent level. \* Significant at the 10 percent level. Regression analysis already took account of multiple imputations. Other dependent variables are included in regression but omitted in this table, including survey year, highest educational attainment (of the respondent), age and age squared (of the respondent), logged real total family income, race (of the respondent), and economic expectations. Regression uses data from 2010, 2013, and 2016 SCF survey.*

Regression results of behavioral measures and self-reported measures do not seem to match up well. Furthermore, different behavioral measures do not seem to align with each other in direction and magnitude. While self-reported measures consistently shows a tendency of positive correlation between risk tolerance and increasing male members, both gay and lesbian couples share shown to have a lower participation rate in stock and bond market as compared to heterosexual couples, though only reduced stock participation among lesbian couples and reduced bond participation among gay couples are significant at 95% level. The inconsistencies are likely results from different household wealth management habits that are not captured in SCF data. Such difference would affect actual investment behaviors more than one's reported financial risk tolerance. Results using proportion of liquid assets as stocks as outcome variables have matched signs, or direction, with both self-reported measures. However, the low significance points out the possibility that such difference does not exist. The only consistent finding across measures are a lower level of financial risk tolerance among lesbian couples, though usually insignificant. It seems that more data and more relevant dependent variables are required for a universal conclusion.

#### 4. Conclusion and Discussion

This paper investigates the willingness to take financial risks among same-sex and

mixed-sex couples and find a higher level of self-reported financial risk tolerance among gay couples as compared to heterosexual couples and lesbian couples. However, results using actual behavioral measures as outcome proxies of financial risk tolerance do not match up with self-reported ones. Such difference might be further explained by measures concerning household wealth management and investment habits. More data are needed for universal conclusion.

Unfortunately, there are major challenges involved in accessing larger and more detailed data. In the case of SCF, it needs not only a larger sample size but also greater distinction among answers to the same question. However, SCF is already the largest publicly available dataset with variables measuring both self-reported financial risk tolerance and household sex compositions. Recently, larger census surveys started to provide measures to distinguish same-sex and mixed sex couples. For example, both Annual Social and Economic supplement (ASEC) to the Current Population Survey (CPS) and American House Survey (ASC) contains at least 15 times of observations than SCF, but only stock market participation is deducible. Without other measures of financial risk tolerance and detailed financial measures, like economic expectations, as reference, it is difficult to argue for any valid conclusions from such analysis. In addition to its relatively small sample size, SCF also does not distinguish some answers in their public data version due to privacy concerns. It leads to failure controlling other factors affecting financial risk tolerance, like marital status (Yao et al, 2005).

It seems that the challenge of accessing proper data related to the topic of this paper will remain for the foreseeable future: while some research attempts to improve access to underresearched population, most only concerns racial and ethnic minority, who faces a different set of challenges than sexual minorities. Unlike these demographic minorities, same-sex couples usually face a larger risk in revealing their identity, since it is usually invisible. Furthermore, because sexual identity is not “inherited”, there are no concentrated regions or population where same-sex and mixed-sex couples would become balanced in numbers. As a result, same-sex couples are almost always an extremely small fraction under randomized sampling. Therefore, such challenge to quantitative analysis comparing same-

sex and mixed-sex couples would remain, whether its data come from census surveys or lab experiments.



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