




# “The effect of age and gender on financial risk tolerance of South African investors”

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# THE EFFECT OF AGE AND GENDER ON FINANCIAL RISK TOLERANCE OF SOUTH AFRICAN INVESTORS

## Abstract

Financial risk tolerance refers to the amount of risk a person is willing to take when making financial decisions. Previous researchers have found that demographic factors when used as independent variables to have an effect on the risk tolerance behavior of investors. Within this study, emphasis was given to gender and age within a sample of South African investors. Not much research on risk tolerance and demographics has been done in South Africa. Hence, an opportunity for further research within this field emerged. This study aimed to contribute towards the accurate risk profiling of South African investors based on their level of risk tolerance considering their gender and age. This study can be used as a future forecasting tool for investment companies to predict risk tolerance levels based on gender and age levels. Results from this study correspond to previous studies where male investors are more risk tolerant than female investors. A statistical difference was also found between male and female investors within the age categories of 35-49 years and investors older than 50 years. All age categories were found to be more risk tolerant for investors older than 50 years based on the binary regression.

## Keywords

risk tolerance, investors, logistic regression, gender, age

## JEL Classification

G23, J16, J14

## INTRODUCTION

Risk tolerance research with emphasis on demographical factors is limited and yet vital to the financial industry. So many of financial and investor researchers do not portray the actual risks that investors face and may be contradictory research that does not consider the multidimensionality of risk and subjectivity of risk tolerance (MacCrimmon & Wehrung, 1986).

Various characteristics of demographic variables are to be considered when researching financial risk tolerance such as years leading to retirement, high education levels, race, being self-employed, gender and non-investment income (Sung & Hanna, 1996). Wang and Hanna (1997) established that there is a relationship between age and risk tolerance. Moreover, Grable and Lytton (1998) found in their research that age and gender were the most important variables influencing risk tolerance along with other characteristics such as marital status, occupation, self-employment, income, race and education. In 1999, Grable and Joo added that high levels of education, financial knowledge, internal locus of control, marital status, professional occupation, high income, solvency and economic expectations are important variables affecting financial risk tolerance. However, Grable and Joo (2000) did not consider gender, age and marital status to be important variables.

In further studies, Gibson et al. (2013) found that investors that were financial clients had a higher level of risk perception and believed income and that investment knowledge have a positive influence on risk tolerance. However, these researchers believed that gender and age have a negative impact on risk tolerance.

## 1. LITERATURE REVIEW

Many factors impact risk tolerance when investors make investment decisions. Whereas risk tolerance is a dependent variable, other factors are independent variables (Tversky & Kahneman, 1981). Due to various financial risk tolerance assessment methodologies, it was found that there are demographic, socio-economic, as well as psychological factors that impact financial risk tolerance (Van de Venter et al., 2012; Nguyen, 2015). A person's tolerance highly influences a person's decision-making process. Irwin (as cited in Bell & Bell, 1993, pp. 7-28) developed one of the first models to demonstrate these factors (Table 1). This table also indicates which factors are assumed more tolerant.

**Table 1.** Factors associated with financial risk tolerance

Source: Irwin (as cited in Bell & Bell, 1993, pp. 7-28).

Individual characteristics	Assumed to be more tolerant
Age	Younger people
Education	Bachelor's degree or higher
Employment status	Employed full-time
Ethnicity	Non-Hispanic white
Financial knowledge	High
Financial satisfaction	High
Gender	Male
Home ownership	Owner
Household size	Large
Income	High
Income source	Business owner
Income variability	Stable and predictable
Locus of control	Internal
Marital status	Single
Marital/gender interaction	Single male
Mood	Happy
Net worth	High
Occupation	Professional
Personality	Type A
Religiosity	Less religiosity
Self-esteem	High
Sensation seeking	High

From Table 1 it can be concluded that individual characteristics influence the risk tolerance levels of investors, as well as which factors are assumed

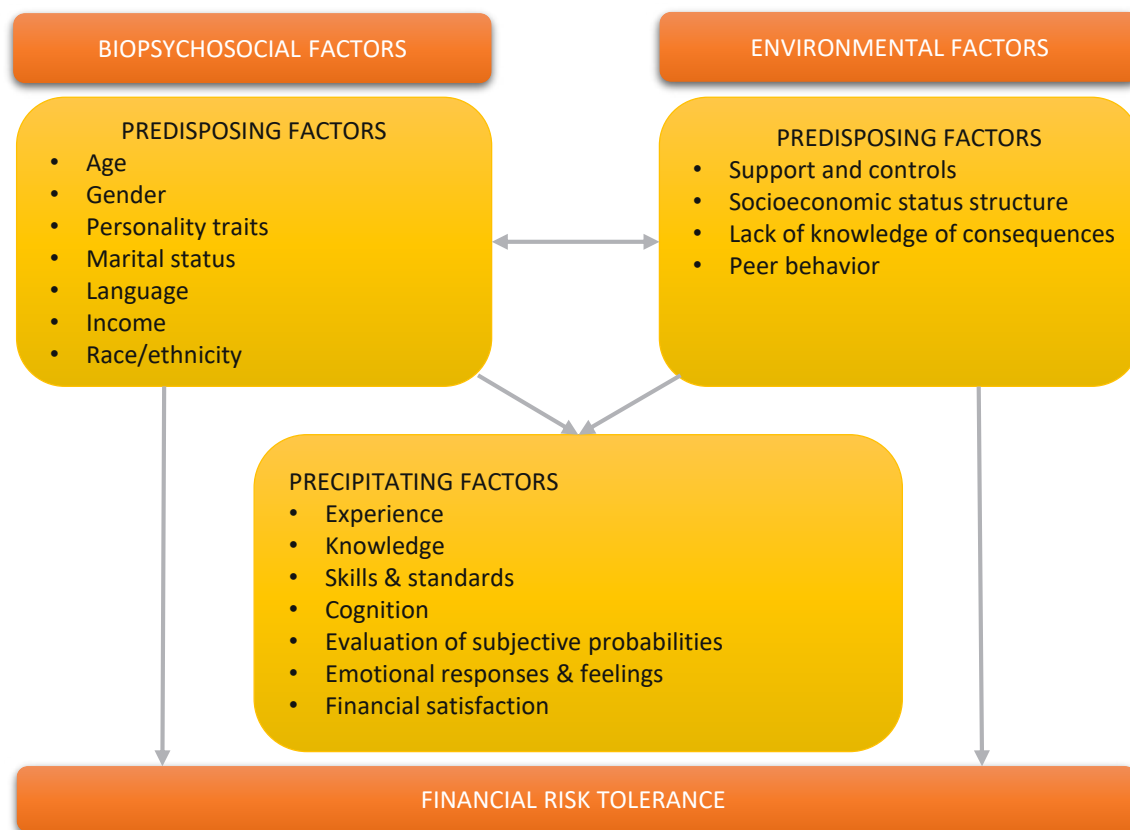
to be more tolerant. Figure 1 presents a graphic presentation of a conceptual model of the main principal factors affecting risk tolerance, namely biopsychosocial, environmental and precipitating factors.

The abovementioned factors can lead to increased or decreased levels of risk tolerance affecting a person's decision to change, adapt or terminate a risky behavior. Sadiq and Ishaq (2014) stated that investor decisions are influenced by demographic factors on investor's level of risk tolerance. Grable (2016) emphasized although an investor might not have control over demographical factors, environmental factors may affect financial decisions due to influences from the social environment. This is important as a supportive environment is part of a person's life and helps to understand and shape investment behavior. Both biopsychosocial and environmental factors play a role in a person's financial risk tolerance. Moreover, precipitating factors are found to also influence risk tolerance levels. These factors typically have an influence on a person's risk assessment as this impacts the decision-making process leading a person to modify and adjust risk tolerance levels and behavior (Grable, 2016).

The age factor in investor risk tolerance has been investigated widely as this relates to a person's ability to measure financial losses. Older investors have less time to recoup or recover financial losses (Grable & Lytton, 1998). The first researchers to investigate the relationship between risk tolerance and age were Wallach and Kogan (1961). These researchers found that older people were reluctant and cautious to take risks in financial decisions.

Moreover, researchers that found a positive relationship between age and risk tolerance were Botwinick (1966), Vroom and Pahl (1971), Baker and Haslem (1974), Okun and DiVesta (1976), Morin and Suarez (1983), Hawley and Fuji (1993), Wang and Hanna (1997), Grable (2000) and Van de Venter et al. (2012). These researchers found that older people tend to be more risk tolerant

Source: Irwin (as cited in Bell &amp; Bell, 1993, pp. 7-28).



**Figure 1.** Conceptual model of principal factors affecting financial risk tolerance

based on binary regression results. However, some researchers such as Sung and Hanna (1996), and Grable and Joo (1999) reported no significant relationship between age and risk tolerance. Clark-Murphy et al. (2009) proved that as investors' age increases, it might lead to higher investment returns. Anbar and Eker (2010) also held the view that there is no significant relationship between age and risk tolerance. Cutler (1995) researched financial risk tolerance and concluded that risk tolerance is a one-dimensional attitude. Regardless of different opinions, it was found that researchers must consider age as an influential factor of investor risk tolerance. As the rate of risk tolerance tends to decrease more as people get older, it influences financial decision-making, investment choices and behavior.

Previous studies conducted emphasize the important role of gender as a factor that influence risk tolerance (Higbee & Lafferty, 1972; Blume, 1978; Coet & McDermott, 1979; Rubin & Paul, 1979; Yip, 2000). The most known finding is that male investors tend to take more risks than female investors

(Sung & Hanna, 1996). The primary objective of this study is to determine whether age and gender play a role in the level of financial risk tolerance South African investors are willing to take and whether there is a difference between males and females in comparison with their age groups. The contribution of this paper is to profile investors based on gender and age in specific financial risk levels.

## 2. METHODOLOGY

The following sections within the methodology represent the research approach and instrument used, the sample size, formulated hypothesis and statistical analysis.

### 2.1. Research instrument

For this study, a quantitative research approach was implemented using a questionnaire consisting of two sections. The first section was aimed at collecting the demographic information of investors

whereby age and gender was used for the purpose of this study. Furthermore, the second section implemented a validated risk tolerance question namely Survey of Consumer Finance (SCF) where an idiosyncratic risk tolerance question was asked. The single risk tolerance question is the only direct measure of risk attitude within the SCF (Gilliam et al., 2010).

The single risk tolerance question is represented by the following question: “Which of the following statements 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?”

1. Take substantial financial risks expecting to earn substantial returns.
2. Take above average financial risks expecting to earn above average returns.
3. Take average financial risks expecting to earn average returns.
4. Not willing to take any financial risks.

The distinct risk tolerance question allowed participants to only select the most relevant option. As in previous research studies, the answer options were reverse coded where options one and two was deemed as more risk tolerant and options three and four less risk tolerant (Grable & Lytton, 2001).

## 2.2. Research sample selection

In order to reach South African investors, a South African investment company was used to collect the sample data for this study. Hence, this study made use of non-probability convenience sampling by using an investment company that has access to South African investors. From the South African investor population, a random sample was selected to ensure unbiasedness. The final sample included 600 investors from an investment company ( $n = 600$ ). Participants received an online questionnaire to complete out of own free will. Table 2 represents the gender frequencies of the sample, as well as the age distribution of the sample.

**Table 2.** Demographic information of the sample

Variable	Category	Frequency	Percentage (%)
Gender	Male	256	42.70
	Female	344	57.30
Age	16-34	150	25.00
	35-49	220	26.70
	50+	230	38.30
Total		600	100.00

Referring to the demographic information in Table 2, more than half of the participants were females (57.30%), while the remaining percentage (42.70%) represented male participants. Age distribution indicated that the majority of the participants (38.30%) were over 50 years of age with the oldest participant being 85 years old. Following this age category was the 35-49 years age category representing 26.70% of the sample. The remaining percentage were investors between the ages of 16-34 years (25.00%).

## 2.3. Hypothesis

Based on the background of the study, previous researchers found a difference between the risk tolerance levels of males and females and between different age groups. The following hypothesis were formulated to research the primary objective of this study:

$$H_0: \text{mean of male risk tolerance within age group} = \text{mean of female risk tolerance within age group.}$$

The abovementioned hypothesis suggests that no difference exist between male and female investors' risk tolerance levels within different age categories.

## 2.4. Statistical analysis

This study made use of descriptive statistics such as cross tabulations, as well as logistic regression to test how risk tolerance between males and females within each age category differs. The following equation presents the estimated logistic regression:

$$SCF_i = \beta_0 + \beta_1 GEN + \beta_2 AGE + \mu_i. \quad (1)$$

The dependant variable was created using the SCF risk tolerance question, where  $SCF_i$  presents de-

**Table 3.** Cross tabulation of investor risk tolerance of gender and age

Variable	Category	Risk tolerance level of investors				Pearson Chi-square
		Not willing to take any risk	Take average risk	Take above average risk	Take substantial risk	
Gender	Male	14.50	42.20	31.60	11.70	0.000* (23.931)
	Female	27.00	45.90	18.90	8.10	
Age	16-34	13.30	46.60	26.70	14.00	0.001* (23.208)
	35-49	24.50	36.40	28.20	10.90	
	50+	24.30	50.90	19.10	5.70	

Note: \* Significant at 1% level.

pendant variable – the risk tolerance level of South African investors (1 for substantial risk tolerance and 0 for low risk tolerance). By using the SCF measure of risk tolerance as the dependant variable, previous researchers have found demographic factors such as age and gender to have an effect on individual risk tolerance (Grable & Lytton, 2001). The equation presents the following:  $\beta_0$  represents the constant;  $\beta_1$  and  $\beta_2$  is the coefficients and  $\mu_i$  gives the error term. Two independent variables were created where  $\beta_1 GEN$  was given as the gender of investors (1 for males and 0 for female);  $\beta_2 AGE$  presents the age of the individual investors (1 = 16-34, 2 = 35-49, 3 = 50+).

### 3. EMPIRICAL RESULTS AND DISCUSSION

#### 3.1. Investor risk tolerance according to gender and age

Table 3 reflects the cross tabulation of the various levels of investor risk tolerance according to their gender and age.

The high Chi-square value (23.931) with a  $p$ -value 0.000 between gender and SCF is indicative of a statistical difference between the risk tolerance level of males and females within the sample. Within the sample males are more likely to take above average risk (31.60%) to earn above average returns compared to female investors (18.90%). Considering the age distribution, investors within the age category of 50 years and older was more likely to take average risk (50.90%) than younger investors between the age of 35-49 years (36.40%) and 16-34 years (46.60%). The majority of young investors between the ages of 16-34 years tend to take more average risk (46.60%) or no risk at all (13.30%) indicating that more than half (59.90%) of the young investors are low risk tolerant. Only 40.7 percent of young investors (16-34) were willing to take above average risk and substantial risk. These results are the exact opposite of the general investor lifecycle theory stating that younger investors should be more willing to take on higher risk (Bodie et al., 2007). Several reasons for the lower risk tolerance in younger investors exist. Firstly, although younger investors tend to take on more risk, it does not always lead to higher returns and will ultimately lead to lower risk toler-

**Table 4.** Comparing male and female investors within age categories

Variable	Category	Risk tolerance level of investors				Pearson Chi-square
		Not willing to take any risk	Take average risk	Take above average risk	Take substantial risk	
Age 16-34	Male	5.80	44.20	28.80	21.20	0.089 (6.521)
	Female	17.30	46.90	25.50	10.20	
Age 35-49	Male	17.30	28.40	40.70	13.60	0.05** (13.006)
	Female	28.80	41.00	20.90	9.40	
Age 50+	Male	16.30	50.40	26.80	6.50	0.01* (15.645)
	Female	33.60	51.40	10.30	4.70	

Note: \* Significant at 1% level, \*\* significant at 5% level.



ance levels (Sultana, 2010). Secondly, while young investors are still in the accumulation phase, some might have a longer time horizon (20-30 years), which will also lead to lower risk tolerance levels, since there are no immediate need for excessive returns (Yao et al., 2011).

Hence, the comparison between the risk tolerance levels of the different age groups suggests a statistical difference between age categories 16-34 years, 35-49 years and 50+ years with a high Chi-square value of 23.208 and a  $p$ -value of 0.001.

As seen in Table 4, a significant statistical difference at 5.00% exist between the risk tolerance level of males and females within the age category of 35-49 years. Within this age category males were more likely to take on above average risk (40.70%) compared to female investors (20.90%). A statistical difference also exist between males and females within the 50+ age group where females (33.60%) are not willing to take on any risk compared to 16.30% of male investors. No statistical significant difference exist between male and female investors within the ages of 16-34 ( $p$ -value > 0.05).

### 3.2. Regression analysis

Table 5 indicates the results found for the logistic regression considering the influence of gender and age on the financial risk tolerance levels of South African investors.

The Omnibus test for model coefficients proved to be significant at 1.00% considering  $p$ -value < 0.01 with a Chi-square value of 39.395. This implies that the new model is significantly better and passed the goodness fit model. Furthermore, the Hosmer & Lemeshow test of the goodness fit suggests that this model is a good fit for the data as

$p$ -value = 0.888, which is greater than the 0.05 significance level. The Nagelkerke  $R$ -squared test also suggests that the model coefficients explained 8.80% of the variation in the dependant variable. The relatively low Nagelkerke  $R$ -squared is indicative of that only two demographical factors namely age and gender was used to explain the variation in the risk tolerance level of investors. In the binary logistic regression, three age groups were entered with the 50+ age category as the reference group.

The results in Table 5 indicates that male investors were more likely to be high risk tolerant than female investors, since a positive coefficient (Beta = 0.904) was observed for gender. The statistically significant  $p$ -value (0.000) for gender infers that the null hypothesis can be rejected at a 1.00% level of significance. This indicates that there is indeed a difference between male and female investors in terms of their risk tolerance levels. The odds ratio of 2.469 specifies that (2.469 – 1) male investors are 146.90% more likely to be high risk tolerant compared to female investors. These results concurs with previous research done by Slovic (1966), as well as Sung and Hanna (1996) who indicated that in some cultures it was believed that males tend to take greater risks than females.

For the age category 16-34 years it is found that this group of investors are more likely (positive coefficient) to be higher risk tolerant than investors older than 50 years. Investors within this category are (2.562 – 1) are 156.20% more likely to be high risk tolerant than older investors. This concludes that the null hypothesis can be rejected. A positive coefficient was also found for the age category 35-49 years indicating that this age category are more likely to be high risk tolerant than investors over the age of 50.

**Table 5.** Binary logistic regression analysis

Variable	Beta	Std. Error	Wald	df	Sig.	Odds ratio
Gender	0.904	0.184	24.132	1	0.000*	2.469
16-34	0.941	0.236	15.889	1	0.000*	2.562
35-49	0.851	0.215	15.686	1	0.000*	2.343
50+	–	–	–	2	0.000*	–
–2 Log likelihood 729.848			Omnibus test 39.395			
Hosmer & Lemeshow 1.142 p-value (0.888)			P-value 0.000			
Nagelkerke R-squared 0.088						

Note: \* Significant at 1% level.

The  $p$ -value (0.000) for the age category of 50+ years concludes that the null hypothesis (coefficients = 0) can be rejected at a 1.00% level of significance. This indicates that there is indeed a difference between the risk tolerance level amongst investors within different age categories. It can be

assumed that young investors have more years to recover from financial losses due to risky investments based on the binary regression results. Cutler (1995) researched financial risk tolerance and concluded that the rate of risk tolerance tends to decrease more as people get older.

## CONCLUSION

Previous researchers have found that demographical factors when used as independent variables have an effect on the risk tolerance of investors. Within this study, emphasis was given to gender and age within a sample of South African investors. Not much research on risk tolerance and demographics have been done in South Africa. Hence, an opportunity for further research within this field emerged. This study aimed to contribute towards the accurate risk profiling of South African investors based on their level of risk tolerance considering their gender and age. Results indicated that a difference does exist not only between male and female investors, but also within different age groups. It can be assumed that young investors have more time to recover from financial losses and, as a result, would be willing to take on more risks based on the binary regression results. However, cross tabulation indicated that majority of young investors were not willing to take on any risk or just average risk. This could be due to the failure to accept excessive risk or due to longer time horizons. Investment companies could therefore also suggest investments within an average risk category. Moreover, male investors tend to take on more risks than female investors, which is concurrent with previous studies. In the various age categories, male investors are willing to take more substantial risks compared to female investors. Hence the null-hypothesis was rejected for two of the three age groups. This will significantly contribute towards the risk profiling of investors to accurately invest according to a specific risk tolerance level.

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