

## **Risk Tolerance, Demographics and Portfolio Performance**

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### **Abstract**

*The purpose of this study was to establish whether risk tolerance differs among investors based on their demographics (age, gender, education, and experience) and also to determine the relationship between risk tolerance and portfolio returns. A sample comprising of 279 investors who trade at the Nairobi Securities Exchange, Kenya was considered. Data was analyzed using ANOVA and regression analysis. The findings depicted that female investors, experienced investors, those with no academic qualifications and also older investors were more risk tolerant. As such, they held risky equity portfolios. Regression results indicated that risk is positively related with portfolio returns without the effect of demographics. However, when demographics moderate the relationship between risk and portfolio returns, the relationship becomes insignificant. The study concludes that age, gender, experience and education do not moderate in the relationship between risk and portfolio performance.*

**Keywords:** Risk tolerance, demographics, Portfolio returns

### **1.0 Introduction**

Investment decisions involve risk. As such, investors should analyze their options objectively so as to minimize risk and optimize returns. According to utility theory, the amount of risk that an investor takes depends largely on the utility derived from taking the risk. Rational investors will not expose themselves to high risk unless they perceive the returns to be higher (Friedman & Savage, 1948). This is supported in modern portfolio theory where investors are required to select their assets objectively so as to reduce portfolio risk and maximize returns (Markowitz, 1952). However, in practice, investors tend to hold risky portfolios which may not adequately be compensated by the prevailing returns. This may be attributed to poor selection skills where investors choose highly correlated assets or psychological influences. This study considers investors who trade at the Nairobi Securities Exchange (NSE), Kenya. NSE is an emerging market with 1,612,338 individual investors (CMA, 2016). The study had four objectives. Firstly, the study sought to establish the investors' portfolio risk in their equity investments only. Secondly, to determine whether the risk tolerance levels differ based on the individual demographics. Lastly, to establish the relationship between risk tolerance and portfolio returns while moderating for demographics. The research questions were:

1. Does risk tolerance differ in terms of demographics?
2. What is the relationship between risk tolerance and portfolio returns?
3. Do demographics moderate in the relationship between risk tolerance and portfolio returns?

## **2.0 Literature Review**

Embrey and Fox (1997) investigated gender differences in the investment decision making process. The study used a survey of Consumer Finances and a sample of 4,299 households was considered. The findings depicted that women invest in less risky assets than men. However, women were more likely to hold risky assets if they were expecting an inheritance, employed and holding higher net worth. Men were also found to invest in risky assets if they were risk seekers, divorced, older and college educated.

In an experiment carried out by Powell and Ansic (1997), 73% of the females were risk averse as compared to 63% for males. However, the difference was not significantly different. Dwyer, Gilkeson and List (2002) conducted a study in the USA to establish whether gender affected the level of risk taking among mutual fund investors. A sample of 2000 was considered which data from a national survey was used. The findings depicted that men chose investments with more risk as compared to women which depicted they were more risk tolerant. However, acquisition of financial knowledge contributed to more risk taking. Also it was found that investors with higher wealth levels and education took more risky options as compared to less wealthier and less educated investors. Another study by Ang and Hodrick (2006) considered the effect of cross-sectional volatility on expected returns. The duration considered was 1986-2000. The findings depicted that stocks with high idiosyncratic volatility had low returns. Also stocks with high systematic volatility reported low returns.

An investigation on the relationship between demographic variables and investment decisions among investors in Surabaya was conducted by Lutfi (2010). A sample of 84 investors was considered. The results showed that men were more risk tolerant than women. Single investors were risk seekers while married investors were risk averse. Low income investors were risk averse while more wealthy investors were risk seekers. Lastly, small family investors were risk seekers unlike big family investors who were risk averse. Similar findings were found by Fisher (2010) where the findings showed that females exhibited lower risk tolerance levels and had shorter saving horizon. In term of risk tolerance, 58.1% indicated that they were not willing to assume any financial risk as compared to men's rating of 39.8%. Also 43% of the females preferred short saving as compared to 31% rating for men.

Buccioli and Miniaci (2011) considered risk tolerance among US households and its effect on their portfolios. The results showed that risk tolerance was negatively related with age but positively related with wealth and sophistication. However, education, race and household size were not correlated with risk tolerance. Çankaya, Ucal and O'Neil (2013) studied risk attitude and risk tolerance among students in a Turkish University. A questionnaire was used where investors were asked to respond to hypothetical questions on financial decisions. Women were found to be less risk tolerant in their finance decisions as compared to men who had a risk seeking attitude. An empirical study conducted by Anbar and Eker (2013) on personal financial risk tolerance and demographic characteristics showed that there were significant differences in financial risk tolerance in terms of gender whereby females were less risk tolerant. However, there were no significant differences in terms of age, marital status and number of children. The logistic regression results indicated that gender, type of department and working in a job had a significant effect on financial risk tolerance. The study used a survey and a sample of 1097 students for the year 2008 was considered. Data was analyzed using logistic regression, t-test and ANOVA.

Sadiq and Ishaq (2014) did a study on the influence of demographics on the behavior of investors when choosing their investments. Data was collected using questionnaires and a sample of 100 respondents was used. The results showed that education, investment knowledge and investment experience affected the level of risk tolerance among Pakistan investors. However, gender, marital status, occupation and family size did not affect the risk tolerance levels in financial decision making.

### 3.0 Research Gap

Most of the studies reviewed have been done in developed financial markets whose operations are different from emerging markets. None of the studies has been done in Kenya which is an emerging market. This study will fill this gap by using secondary data to measure risk tolerance levels for equity portfolios held by individual investors. The previous studies used surveys where hypothetical questions were used to measure risk tolerance for example Çankaya and O'Neil, 2013) or experiments (Anbar & Eker, 2010).

### 4.0 Research Methodology

The study was conducted among investors who traded at the Nairobi Securities Exchange, Kenya for the year 2015. The population of the study comprised of 1,629,746 (CMA, 2015) investors as at December, 2015. Due to the big size, a random sample of 279 investors was used in the study. Primary data was collected using questionnaires and secondary data (share prices) was obtained from the NSE website. Data was analyzed using ANOVA and regression analysis.

### 4.0 Results and Discussions

#### 4.1 Risk Tolerance and Demographics

ANOVA was used to ascertain whether risk tolerance differed among individual investors based on their demographics. The results are presented below:

##### 4.1.1 Risk Tolerance and Gender

Female investors held more risky portfolios (mean=0.207) than the male investors (mean = 0.204) which depicts higher risk tolerance as indicated in Table 4.1. This may be attributed to lack of selection skills which leads to choosing of highly risky securities. However, the difference was found to be insignificant (p-value >0.05). The high risky portfolio affected the portfolio returns of the female investors as they earned lower returns as indicated in appendix 1. This implies that the high risky stocks did not earn higher returns as it is expected under mean-variance theorem.

**Table 4.1: Risk Tolerance and Gender**

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
FEMALE	128	.207379	.4051841	.0358136	.0118	4.1433
MALE	151	.204450	.2102813	.0171124	.0112	1.0986
Total	279	.205794	.3144222	.0188240	.0112	4.1433

Source: Author, 2017

##### 4.1.2 Risk Tolerance and Experience

Experience depicted the number of times individual investors had conducted transactions at the NSE. Table 4.2 below shows that experience affected the level of risk tolerance among the investors. As such, investors with the least experience had less risky portfolio as compared to the other groups but the difference was insignificant (p-value > 0.05). In terms of portfolio returns, investors with the least experience and less riskier portfolios earned the lowest returns (appendix II). This depicts that inexperienced investors exercised more caution in investment due to their low risk tolerance which affected their returns adversely.

**Table 4.2: Risk and Experience**

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
5 OR LESS	142	.176431	.3624373	.0304151	.0112	4.1433
6-10 TIMES	46	.229615	.2161546	.0318703	.0131	.7553
11-15 TIMES	12	.213242	.1612895	.0465603	.0308	.4416
16-20 TIMES	12	.312658	.2679528	.0773513	.0308	.9818
MORE THAN 20 TIMES	67	.231196	.2874559	.0351183	.0169	1.7381
Total	279	.205794	.3144222	.0188240	.0112	4.1433

Source: Author, 2017

#### 4.1.3 Risk Tolerance and Education

The education levels which were considered were certificate, diploma, graduate, post graduate and 'Any Other'. Investors with certificate level of education were less risk tolerant and held portfolios with less risk (mean=0.13) while investors with no academic qualifications were more risk tolerant and had the most risky portfolios (mean=0.23) as depicted in Table 4.3. Investors with graduate and post graduate degree had tolerance levels of 0.22 and 0.20 respectively. The differences were not significant as the p-value > 0.05. Portfolio returns were lowest in the group with no academic qualification and with the highest risk (appendix III). This evidences poor choice of assets which may be attributed to lack of education.

**Table 4.3: Risk Tolerance and Education**

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
CERTIFICATE	25	.129704	.1573844	.0314769	.0131	.6389
DIPLOMA	51	.216337	.2963766	.0415010	.0112	1.7381
GRADUATE	141	.215304	.3754996	.0316228	.0155	4.1433
POST GRADUATE	51	.201011	.2065869	.0289280	.0131	1.0986
ANY OTHER	11	.230109	.2126698	.0641223	.0531	.8111
Total	279	.205794	.3144222	.0188240	.0112	4.1433

Source: Author, 2017

#### 4.1.4 Risk Tolerance and Age

The study considered five age brackets: 18-25 years, 26-35 years, 36-45 years, 46-55 years and more than 55 years. The results show that age has an influence on the level of risk tolerance among investors as shown in Table 4.4. Older investors held the most risky portfolios (mean=0.284). They also earned the highest returns of 1.68 (appendix IV). This group of investors may have gained experience in how to choose optimal stocks. This implies that the high risky stocks had corresponding high returns. Risk tolerance levels for 18-25 years, 26 – 35 years, 36 – 45 years, and 46 – 55 years were 0.24, 0.19, 0.16 and 0.24 respectively. However, the differences were not significant (p-value >0.05).

**Table 4.4: Risk Tolerance and Age**

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
18-25 YEARS	47	.242527	.5977248	.0871871	.0204	4.1433
26-35 YEARS	99	.194465	.1826595	.0183580	.0169	.9818
36-45 YEARS	77	.162463	.1807129	.0205941	.0118	1.0986
46-55 YEARS	37	.239480	.3146840	.0517337	.0112	1.7381
MORE THAN 55 YEARS	19	.283961	.2742093	.0629079	.0131	1.0799
Total	279	.205794	.3144222	.0188240	.0112	4.1433

Source: Author, 2017

#### 4.2 Relationship between Risk Tolerance and Portfolio Returns

The study ascertained the effect of risk tolerance on portfolio returns while moderating for demographics. The regression results showed three models as shown in Table 4.5. The first model considered the relationship between portfolio risk and portfolio returns. The results show that risk had a positive and significant relationship with portfolio returns ( $\beta=0.829$ ,  $p<0.05$ ) without the effect of demographics. In model 2, demographics are incorporated and the results depict a positive and insignificant relationship between demographics and portfolio returns ( $\beta=0.211$ ,  $p>0.05$ ). However, the relationship between portfolio risk and returns remains positive and significant ( $\beta=0.796$ ,  $p<0.05$ ). When the interaction term (*risk\*demographics*) is included in model 3, the regression coefficient for portfolio risk is negative and insignificant ( $\beta=-0.368$ ,  $p\text{-value}>0.05$ ). Demographics are positively related with portfolio returns but the relationship is insignificant ( $\beta=0.031$ ,  $p\text{-value}>0.05$ ). The interaction term is also positive and insignificant ( $\beta=0.664$ ,  $p\text{-value}>0.05$ ). This implies that age, gender, experience and education do not moderate in the relationship between risk and portfolio performance.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.876	.098		8.960	.000		
	PORTFOLIO RISK	.829	.261	.188	3.183	.002	1.000	1.000
2	(Constant)	.442	.309		1.431	.154		
	PORTFOLIO RISK	.796	.261	.180	3.052	.002	.993	1.007
	demographics	.211	.142	.087	1.480	.140	.993	1.007
3	(Constant)	.761	.355		2.146	.033		
	PORTFOLIO RISK	-.368	.694	-.083	-.530	.596	.139	7.185
	demographics	.031	.173	.013	.181	.857	.667	1.500
	Risk*demographics	.664	.367	.300	1.809	.071	.126	7.968

Source: Author, 2017

### 5.0 Conclusion

Female investors were more risk tolerant and held riskier portfolio as compared to male investors although the difference was insignificant. This is contrary to previous studies for example Jianakoplos and Bernasek (1996) and Zinkhan and Karande (1991) where male investors were found to be more risk tolerant. This may be attributed to the fact that this study considered equity portfolio only while the other studies had a more elaborate portfolio of assets. In terms of experience, investors with the least experience had less risky portfolio as compared to the other investors, although insignificant. Inexperienced investors could be choosing their stocks with caution unlike the experienced investors, who may be overconfident and choose high risky portfolios. Level of education does not significantly affect risk tolerance among the investors. However, investors with no academic qualifications held the most risky portfolios. This may be associated with the lack of financial education among the investors. In terms of age, older investors were more risk tolerant and held riskier portfolios but the difference was insignificant. Similar findings were obtained by Anbar and Eker (2013). Regression results indicate that risk is positively related with portfolio return without the effect of demographics. This concurs with Markowitz (1952) where investors ought to be compensated for any risk incurred such that the higher the risk the higher the returns. However, when demographics moderate the relationship between risk and portfolio returns, the relationship becomes insignificant. The study concludes that age, gender, experience and education do not moderate in the relationship between risk and portfolio performance. These findings are of importance to investors at the stock market as it equips them with knowledge on how their individual differences influence their risk tolerance levels and the impact on portfolio returns. Investment advisors will also gain as they will know how to advise the individual investors based on their demographics. A further research to establish whether risk tolerance levels are associated with behavioral biases is recommended.

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## Appendices

### Appendix I: Portfolio Returns and Gender

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
FEMALE	128	1.0136	1.36922	.12102	-.46	4.78
MALE	151	1.0748	1.40764	.11455	-.33	6.70
Total	279	1.0467	1.38799	.08310	-.46	6.70

### Appendix II: Portfolio Returns and Experience

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
5 OR LESS	142	.8750	1.28470	.10781	-.46	5.51
6-10 TIMES	46	1.1335	1.48998	.21969	-.28	4.78
11-15 TIMES	12	1.4274	2.11911	.61173	-.13	6.70
16-20 TIMES	12	1.7199	1.52856	.44126	.10	3.85
MORE THAN 20 TIMES	67	1.1623	1.32144	.16144	-.32	4.01
Total	279	1.0467	1.38799	.08310	-.46	6.70

### Appendix III: Portfolio Returns and Education

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
CERTIFICATE	25	.8954	1.38506	.27701	-.33	3.68
DIPLOMA	51	.9987	1.34219	.18794	-.46	3.85
GRADUATE	141	1.0299	1.38138	.11633	-.24	6.70
POST GRADUATE	51	1.2319	1.51598	.21228	-.32	4.78
ANY OTHER	11	.9701	1.21876	.36747	.00	3.62
Total	279	1.0467	1.38799	.08310	-.46	6.70

### Appendix IV: Portfolio Returns and Age

	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
18-25 YEARS	47	.8492	1.21693	.17751	-.23	3.87
26-35 YEARS	99	1.2758	1.51669	.15243	-.33	6.70
36-45 YEARS	77	.9627	1.37236	.15639	-.46	4.78
46-55 YEARS	37	.5330	.69307	.11394	-.20	2.82
MORE THAN 55 YEARS	19	1.6820	1.77295	.40674	-.13	5.51
Total	279	1.0467	1.38799	.08310	-.46	6.70