

Differential Investment Performance In South Africa Based On Gender And Age

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ABSTRACT

Behavioral finance shows us that individuals do not always behave rationally, owing to certain behavioural biases. A certain bias known as overconfidence has been found to incite increased trading frequency which in turn, reduces the overall return earned. Behavioral biases manifest differently amongst men and women of different ages. Men and more overconfident and women are more risk averse, whilst the young hold more volatile portfolio's and the more experienced display fewer of these biases. A sample of 19,021 individual investors from a South African investment house was analysed over five years in order to draw conclusions on the trading behaviour, returns earned and variances in these returns earned by men and women of different ages. The results showed women over the age of 60 years earning statistically significantly higher returns than men and older investors having lower variances in return. For investors of younger ages, no statistically significant difference in the returns earned by men and women are noted, however men were found to have higher variances of returns. Whilst the trading frequency of men is statistically significantly higher than women for the total sample of investors; this result is not consistent amongst the different age-groupings analysed.

Keywords: Gender; Age; Men And Women; Behavioral Biases; Trading Frequency; Variances Of Return

1. INTRODUCTION

Research in behavioral finance has shown that behavioural biases manifest differently in men and women and in investors of different ages. Prior research has revealed men to be more overconfident than women and overconfidence has been found to result in increased trading frequency. Older and more mature investors have been found to display fewer behavioral biases than their younger counterparts, which suggests reduced trading as men age. Most existing research has also concluded that such increased trading lower returns earned, however, limited research has been performed in this area.

Testing of these biases in emerging markets is limited. The aim of this study is to contribute to the international body of knowledge already available on investor behaviour by testing the theoretical findings in the South African market. A comparison of the trading frequency and investor returns earned by men and women of different ages will be analysed.

The remainder of this paper is structured as follows. Section 2 reviews prior literature on the development of behavioral biases within the field of behavioral finance. Section 3 presents the data with a discussion of the methodology adopted in testing the hypotheses. The results are then presented in Section 4 while Section 5 concludes.

2. LITERATURE REVIEW

The efficient markets hypothesis (Fama & French, 1992; Fama & Macbeth, 1973) presumes that individuals will make decisions and behave in a way that will increase their expected utility. Yet, history has revealed certain events such as the stock market bubbles in Taiwan, Japan and the U.S. (Ritter, 2003) as well as the more recent financial crisis of 2008/9 (see Annexure 1) which do not support this presumption. Behavioral finance and its

associated behavioral biases present some explanations, centred on the assumption that individuals are perhaps not fully rational (Subrahmanyam, 2008).

Research has further shown that behavioural biases manifest differently between men and women (Barber & Odean, 2001; Charness & Gneezy, 2012) and amongst investors of different ages (Goyal, 2004; Wang, 2011). This study will review the behavioral biases which have found to reveal the largest differences between men and women and investors of different ages, namely overconfidence (Barber & Odean, 2001) and overtrading (Barber & Odean, 2000; Loibl & Hira, 2011; Willows & West, 2015).

2.1 Overconfidence

An overconfident human being, being egoistic will overestimate his or her chances of success (Rammstedt & Rammsayer, 2002) and intensely believe that their chosen decisions are vital to advance their aims (Friedrichs & Opp, 2002). In an experiment administered to 1 359 subjects in the United States, Estes and Hosseini (1988) found that when it came to the realm of investment decisions, confidence was mostly explained by gender. After controlling for age, education, ability, experience and when the expected outcomes of the different investments were held equivalent, women's confidence was found to be lower than that of men. This finding was supported by Gysler, Kruse and Schubert (2002) and Bhandari and Deaves (2006) who both found men to be significantly more confident than women. The former study involved students as subjects while the latter focused on Canadian male pension plan participants specifically. Additionally, both Biais, Hilton, Mazurier and Pouget (2005) and Cheng (2007) discovered overconfidence to have a negative effect on trading performance. Biais et al. (2005) found the effect of this psychological variable to be stronger in men and non-existent in women.

Hira and Loibl (2008) discovered that men felt more confident regarding investments (70% of men vs. 50% of women) and in their investing abilities (70% of men vs. 62% of women) and that they are more likely to make changes to their investments if they found they weren't delivering the returns that they expected. This behaviour is supported by Barber and Odean (2001)'s study that men hold unrealistic beliefs about how high their returns will be, owing to their inherent overconfidence and are more impulsive and willing to act on too little information. Greenwood and Nagel (2009) further found inexperienced investors (often referred to as younger investors (Feng & Seasholes, 2005)) to be more prone to such optimism and Prosad, Kapoor and Segupta (2013) revealed investors becoming more overconfident when they experienced high returns from past trades.

Overconfident investors have been found to be more sensation seeking and to trade more regularly as a result of this (Grinblatt & Keloharju, 2009), with these frequent trades often being deleterious to returns earned (Bailey, Kumar, & Ng, 2011). Whilst overconfidence cannot be held solely responsible for increasing trading behaviour (Glaser & Weber, 2014), the increased trading behaviour in itself has been found to adversely affect the return earned (Barber & Odean, 2001; Sieck & Arkes, 2005).

2.2 Overtrading

Investigating the trading behavior of 401(k) investors, Agnew, Balduzzi and Sunden (2003) observed men and older participants trading more actively than women and younger participants. The average annual number of trades was 0.28 for men and 0.18 for women, with men trading 56% more than women. Participants below 35 years of age traded, on average, 0.17 times per year whilst participants in the 55-64 years age group traded 0.60 times per year. An exception was noted in the 65 years and older age group, where participants traded only 0.03 times per year. As an individual approaches retirement their financial wealth should have grown over time and the need to reallocate to safer and lower-risk funds might explain the increased trading frequency, while, once retired i.e. over 65 years old, they should merely be withdrawing an annuity from their investment. These models of behaviour appear to be quite rational (Agnew et al., 2003).

Upon analysing account data from a large discount brokerage house from February 1991 through to January 1997, Barber and Odean (2001) noticed that men traded 45% more than women and that women held slightly smaller common stock portfolios than men (\$18,371 vs. \$21,975). Investigating whether a man or women

would sell their stock first if they both held the same stock, Feng and Seasholes (2008) observed that men were 20.73% more likely to sell first.

Overtrading has been held partly responsible for reducing returns earned by investors. This was concluded owing to the observation that individuals trade stock in a different manner to that which could be expected of the theoretical ‘rational’ trader. Barber and Odean (2000) observed that investors who traded the most earned an annual return 6.5% below that of the comparable market return. This is further supported by Willows and West (2015) who found trading frequency to lower returns, which Willows and West (2015) partly explain by two phenomena: the effects of mistimed trades and trading costs.

2.3 Age Differentials In Biases

Individual investment decisions have been found to be affected by the age of the investor (Goyal, 2004). Feng and Seasholes (2005) point out that experience, along with sophistication, minimise the disposition effect. Furthermore, Cheng, Lee and Lin (2013) observed the disposition effect to be stronger in women. The “disposition effect” describes the propensity of investors to realise gains (winners) sooner than losses (losers) through selling profit making investments more readily than loss making investments (Barberis & Xiong, 2009; Dhar & Zhu, 2002). Prosad et al. (2013) tested the proposition that overconfidence and the disposition effect account for an increase in transaction volume in the days following positive returns in the Indian market. Furthermore, Prosad et al. (2013) managed to segregate the disposition effect from overconfidence and found the disposition effect to be predominant compared to overconfidence.

Upon investigating the variances in returns of men and women as they age, Willows (2014) found that the variance in return earned by men decreased as they got older, whilst for women it increased up until the age of 50, after which it then decreased. Korniotis and Kumar (2011) found that the older and more experienced investors are, the less risky were the portfolios that they held and the less they traded. Furthermore, they displayed fewer behavioral biases. Amidst these findings though, their skill at investing worsened as they got older, with a sharp drop being seen at age 70, owing to cognitive aging. Barber and Odean (2001) also reported that monthly turnover decreases by 31 basis points per decade that an individual ages. The adverse effects of aging seem to out-weigh the positive effects of investment experience, as older investors were found to decrease their annual returns by 3-5% (Korniotis & Kumar, 2011).

2.4 Conclusion

Strong evidence to support the existence of behavioral biases has been noted in the literature reviewed. The literature consistently shows that men are more overconfident than women, and that overconfidence assists the propensity to overtrade. Most existing research concludes that overtrading lowers returns. Whilst the manifestation of behavioral biases are shown to diminish as an investor ages, the cognitive effects of aging are seen to outweigh this benefit. Within a South African context, Willows and West (2015) investigated gender differences in investment performance, but no studies have examine these gender difference amongst different age cohorts. As such, the investigation in this study is required to make a contribution to the international body of knowledge already available.

3. DATA AND METHODOLOGY

3.1 Research Questions

The literature reviewed and previous findings noted by Willows and West (2015) suggest that women are better investors than men inasmuch as the studies indicate that women earn higher average returns than men.

The research questions for this study are as follows:

1. Do men trade more than women amongst different age cohorts?
2. Do men earn lower returns than women amongst different age cohorts?
3. Do men have lower variances of return than women amongst different age cohorts?

The null hypotheses are that there is no difference between men and women in either trading frequency ($H_{0,1}$), investment returns ($H_{0,2}$), or variance in return earned ($H_{0,3}$).

3.2 Research Approach

A South African investment house which offers collective investment schemes with various risk profiles to the retail investing public was approached. Specifications were given to the investment house to enable extraction of information regarding the gender, age, trade frequency and return earned of investors over various periods, over a cross section of funds. This data was made available from 1 January 2007 to 31 December 2011 and was subdivided into different sub-periods to draw specific gender and age differences that might be smoothed out over the entire five year period. The periods were measured over calendar years as follows: 1 January 2007 – 31 December 2009 (three years), 1 January 2008 – 31 December 2010 (three years), 1 January 2009 – 31 December 2011 (three years) and 1 January 2007 – 31 December 2011 (five years, being the complete data set).

The data included only non-advised individual investors and excluded all investments by staff, group retirement fund clients and organisations as these investments are likely to be advised. The particular emphasis on non-advised investors is in order to allow for behavioral biases between men and women of different ages to manifest as opposed to distorting them with the effect of a financial advisor investing on behalf of a client of the opposite gender and of a different age. This approach is consistent with Barber and Odean (2001). The data was then stratified into differing age groups as follows: under 20 years of age, 20 – 29 years of age, 30 – 39 years of age, 40 – 49 years of age, 50 – 59 years of age and 60+ years of age. Those investors whose ages could not be determined were excluded from any testing.

3.3 Trading Frequency

Unique to Willows and West (2015)'s study; 'trading' is once again defined as 'switching' where an investor moves money between funds on the investment house's platform. Inclusive of all lump sum contributions and redemptions, a switch frequency count was performed. Regular investments (i.e. debit orders) were excluded from this count. As debit orders are often set-up at the inception of the investment and executed automatically, it may be reasonable to assume that there is less explicit consideration given to these cash flows than to lump sum investments and redemptions, where the decision might be amplified by an assessment of factors such as market price fluctuations.

3.4 Research Method

The data included 19,021 individual investor returns over the five year and three year periods described previously. The return, net of switching costs, was calculated using the traditional method for calculating an internal rate of return (IRR). This is considered acceptable as it standardises the return by taking into account the effects of cash flows into and out of the collective investment schemes and by doing so accounts for the effect of cash injections and withdrawals on investment return. Owing to the fact that the timing of cash flows could well be differentiated between men and women of different ages, this could be a determining factor in differential outcome. Where a calculated return was missing for one or more of the four periods analysed, that particular observation was omitted from the analysis. After sorting all the data into the respective groupings by period, the sample sizes were as follows:

Table 1. Data And Sample Sizes

Calendar Period	No. Of Men	No. Of Women	Total Sample
1 January 2007 – 31 December 2009	6,184 (52%)	5,633 (48%)	11,817 (100%)
1 January 2008 – 31 December 2010	6,988 (53%)	6,305 (47%)	13,299 (100%)
1 January 2009 – 31 December 2011	6,494 (52%)	5,922 (48%)	12,416 (100%)
1 January 2007 – 31 December 2011	6,184 (52%)	5,632 (48%)	11,816 (100%)

An analysis of gender differentials in trading frequency, return earned and variance in return for this data was analysed by Willows and West (2015). Willows and West (2015) revealed a negative correlation between

trading frequency and investor return and that men traded more than women. Furthermore, no statistically significant difference in the return earned by men and women over the respective periods was noticed. However Willows and West (2015) did reveal men to have a higher variance in return, which inferred women being better investors on a risk-adjusted basis. The results of these tests performed by Willows and West (2015) are included in Annexure 4.

The purport of this paper is to determine whether the gender differences found by Willows and West (2015) remain constant amongst different age cohorts. The breakdown between male and female investors of different ages is shown graphically in Annexure 2. Upon further inspection of investors falling under the age of 20 years, the average age was calculated to be 12 years with the majority of investors being between the age of 7 and 9 years. Whilst it would be impressive to believe that children of this age are making their own investment decisions, it is more likely that their parents are doing so on their behalf. It is indeterminable from the data whether a father is perhaps investing on behalf of his daughter, or a mother investing on behalf of her son. In both of these cases the observed gender and age cannot be relied upon. This age group will therefore be excluded from the testing performed.

Given the sample sizes in question, the central limit theorem was applied. The population of returns earned by individual investors was inspected visually for each of the age cohorts. Annexure 3 shows the distributions. Where visually close to normal, the z-test is used to test for the differences in returns and trading frequency between men and women and the Wilcoxon rank-sum tests is used for those not visually close to normal. F-tests are performed on all the age cohorts over all time-periods to measure the variances in return of men and women.

3.5 Limitations

This study is unable to distinguish between married and single investors. As a result, the study cannot control for the influence that a spouse (of a different age and/or gender) may have on their partner's investment decisions. As such, further insight on this was not considered in this study.

4. RESULTS

An analysis of gender differentials in trading frequency, return earned and variance in return will be discussed within separate age groupings. Consideration of gender differentials within the respective age grouping, as well as analysis against the total sample of investors (as analysed by Willows and West (2015)) will be discussed.

4.1 Between 20 And 30 Years Of Age

Men between the age of 20 and 30 years were found to switch statistically significantly more than women, with the average number of switches made by men over the five years ending 31 December 2011 being 0.58 in comparison to women between the age of 20 and 30 years who switched 0.30 times over the same period (Annexure 5.1).

No statistically significant differences were found between the returns earned by men and women in any one of the four time-periods analysed (Annexure 5.2). However, men were found to have a statistically significantly larger variance of returns than women for all four time-periods (Annexure 5.2). These results are consistent with the finding of Willows and West (2015) that trading frequency increases variance in return.

On average, the variance in return seen in this age group is higher than the total sample of investors. This is supported by Barber and Odean (2001) who found that young investors hold more volatile portfolios and are more willing to take on risk.

Whilst there is no statistically significant difference in returns between men and women between the age of 20 and 30 years, there is a statistically significantly higher variance in return for men. Consequently, on a risk-adjusted basis, it must be concluded that women in this age group are better investors. This supports the findings of Willows and West (2015).

4.2 Between 30 And 40 Years Of Age

No statistically significant difference between the switch frequencies of men and women is found in this particular age group (Annexure 6.1). For the three year period ending 31 December 2009, women are found to earn statistically significantly higher returns than men, whilst for the three year period ending 31 December 2011, men are found to earn statistically significantly higher returns than women (Annexure 6.1). Three of the four periods examined show men having statistically significantly higher variances in return (Annexure 6.1). The three year period ending 31 December 2009 shows that women have a statistically significantly higher variance in return (Annexure 6.1). These results are somewhat different to those noted for the total sample by Willows and West (2015).

Potential explanations for the greater average performance by men in the three year period ending 31 December 2011 and women in the three year period ending 31 December 2009, are in line with Willows and West (2015), who presume that women investors (being risk-averse and less prone to trading) who had traded from risky assets into cash during the crisis period would have delayed trading into the risky asset class after the market recovery. This, in turn, would have resulted in men benefiting from the equity market increases (Annexure 1) post the financial crisis more than women, which in turn might explain why men earned higher returns than women in the three year period ending 31 December 2011. The anomaly in this age cohort is that women have a statistically significantly higher variance in return than men in the three year period ending 31 December 2009. This anomaly should be investigated in subsequent research as it might reveal the presence of (or lack of) behavioral biases amongst women of this age grouping.

For all periods except the three year period ending 31 December 2011, both men and women had a statistically significantly higher variance in return than the total sample of investors, which shows an increased propensity to take on risk in this age group. This echoes what was noted with investors between the age of 20 and 30 years and explained by Barber and Odean (2001).

But for the anomalous observation in the three year period ending 31 December 2009, the results are consistent with what has been observed by Willows and West (2015) in the total sample of investors.

4.3 Between 40 And 50 Years Of Age

Men between the age of 40 and 50 years are also found to trade statistically significantly more than women of the same age over the same period (Annexure 7.1). Furthermore, the average number of switches made by men and women between the age of 40 and 50 years (0.88 for men and 0.52 for women (Annexure 7.1)) is less than that of the total sample (1.02 for men and 0.68 for women (Annexure 4.2)). This observation begs the question whether portfolio changes are being made by investors in this age group, and also whether investors in this age group are investing in riskier portfolios as they get older (and closer to retirement age), in order to augment their retirement savings.

In this age group, women earn statistically significantly higher annualised returns for the three year period ending 31 December 2009, whereas men once again earn the statistically significantly higher annualised return for the three year period ending 31 December 2011 (Annexure 7.2). For all three of the three year periods measured, men have statistically significantly higher variances in return (Annexure 7.2).

An observation in this age group of investors is that for all four time-periods, for both men and women, higher variances in return are seen than for the total sample. Although these investors might trade less than the total sample, owing to the nature of their fund selection (potentially higher equity exposure) it might be expected that their variance in return increases. This viewpoint is supported by Yoo (1994) who states that middle-aged investors hold riskier portfolios.

In this particular age group the same conclusion is made as Willows and West (2015): that on a risk-adjusted basis, women are better investors.

4.4 Between 50 And 60 Years Of Age

There is no statistical difference between the trading frequencies of men and women between the age of 50 and 60 years (Annexure 8.1). Once again, women earn statistically significantly higher annualised returns for the three year period ending 31 December 2009, whereas men earn the statistically significantly higher annualised return for the three year period ending 31 December 2011 (Annexure 8.2).

For the five year period ending 31 December 2011 and two of the three year periods ending 31 December 2009 and 2010, men have a statistically significantly higher variance in return than women (Annexure 8.2). For the three year period ending 31 December 2011, women have a statistically significantly higher variance in return than men (Annexure 8.2). No notable differences are noted between the variance in return earned by investors in this age group and the total sample of investors.

While no difference in trading frequency and no dominance by one gender in annualised return is observed in the age group, the statistically significantly higher variance in return earned by men in all but one of the periods investigated remains notably apparent. Owing to this and all else being equal, women between the age of 50 and 60 years are better investors than men of the same age.

4.5 Over 60 Years Of Age

Men over the age of 60 years trade statistically significantly more in comparison to women over the age of 60 years (Annexure 9.1). Furthermore, both men and women over the age of 60 years trade more than the total sample of men and women. Men over the age of 60 years switched 1.34 times over the five year period ending 31 December 2011 in comparison to the total sample of men who switched 1.02 times. Similarly, women over the age of 60 years switched 0.93 times over the same period in comparison to the total sample of women who switched 0.68 times (Annexure 9.1 and 4.2). This behaviour is supported by Agnew et al. (2003) who found that as an individual approaches retirement age (65 years in South Africa) his or her financial wealth should have grown over time and the need to reallocate to safer and lower risk funds might explain the increased trading activity. Furthermore, the withdrawal of an annuity from an investment after retiring would also increase the calculated trade frequency.

For the five year period ending 31 December 2011 as well as the three year periods ending 31 December 2009 and 2010, women earn statistically significantly higher returns than men, while men earn the statistically significantly higher return for the three year period ending 31 December 2011 (Annexure 9.2). Men over the age of 60 years have statistically significantly higher variances of return than similarly aged women over all four time periods investigated (Annexure 9.2).

In this particular age group, both men and women are found to have lower variances in return than the total sample (Annexure 4.3 and 9.2). The lower variances in return show that less risky portfolios are being held by men and women in this age group. This is supported by Korniotis and Kumar (2011) who noted that older and more experienced investors hold less risky portfolios as well as Yoo (1994) who observed that retired investors hold less risky portfolios.

Women over the age of 60 are seen to trade statistically significantly less than men, have statistically significantly lower variances in return, and on average earn statistically significantly higher annualised returns than their male counterparts, making them the better investors.

4.6 Conclusion

Across almost all age groups, except in the 30 and 40 year age group and the 50 and 60 year age group, men had a statistically significantly higher trade frequency than women. This finding is consistent with the literature reviewed (Agnew et al., 2003; Barber & Odean, 2001).

Across almost all age groups, except between the age of 20 and 30 years, women were found to earn statistically significantly higher returns than men for the three year period ending 31 December 2009 and men were found to earn statistically significantly higher returns than women for the three year period ending 31 December 2011. It was only amongst investors over the age of 60 years that women were found to earn statistically significantly higher returns than men for the five year period ending 31 December 2011 and the three year period ending 31 December 2010.

No statistically significant difference in the variance of return earned by men and women was noted for investors between the age of 40 and 50 years in the five year period ending 31 December 2011 and investors between the age of 50 and 60 years for the three year period ending 31 December 2011. An anomalous result was observed for the three year period ending 31 December 2009 in which women between the age of 30 and 40 years had statistically significantly higher variances in return than men of the same age. This finding might be explained by Willows (2014)'s finding that whilst men's variances in return decreased as they get older, women's variances in return increased up until the age of 50 years. Barring these three observations, for all age groups across all time periods investigated, men had statistically significantly higher variances in return than women. Furthermore, older investors appeared to have lower variances in return than their younger counterparts.

In conclusion, the results within the respective age groups are consistent with those seen for the total sample of investors as analysed by Willows and West (2015). On a risk-adjusted basis, women are better investors than men within the various age groups too.

The table below presents a summary of the results of all statistical tests performed across all age grouping as well as for the total sample:

Table 2. Summary Of Results

	Age Group					
	Total*	20 – 30	30 – 40	40 – 50	50 – 60	Over 60
Trade Frequency	M	M		M		M
Return						
5/2011						W
3/2009	W		W	W	W	W
3/2010						W
3/2011	M		M	M	M	W
Variance In Return						
5/2011	M	M	M		M	M
3/2009	M	M	W	M	M	M
3/2010	M	M	M	M	M	M
3/2011	M	M	M	M		M

M: Men's trade frequency or return earned or variance in return is statistically significantly higher than that of women's at a 95% confidence level.

W: Women's return earned or variance in return is statistically significantly higher than that of men's at a 95% confidence level.

5/2011: Five years ending 31 December 2011

3/2009: Three years ending 31 December 2009

3/2010: Three years ending 31 December 2010

3/2011: Three years ending 31 December 2011

* Source: Willows and West (2015)

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary Of Results

The stratification of Willows and West (2015)'s sample into age groups revealed some noteworthy results. Whilst men traded more than women for the total sample of investors, this result was not as prevalent after stratifying the sample into differing age groups. Only half of the age groups reflected men trading significantly more than women. However, in no age group was it noted that women trade more than men.

For most age groupings and in most periods examined there is no statistically significant difference between the returns earned by men and women, except in the following instances:

- For the three year period ending 31 December 2009, women were found to statistically significantly outperform men for the total sample as well as in most individual age groupings.
- Women over the age of 60 years also outperformed men by a statistically significant margin for the five year period ending 31 December 2011 and the three year period 31 December 2010.
- Counter to these observations, for the three year period ending 31 December 2011 men were found to statistically significantly outperform women for the total sample as well as in most of the individual age groupings. The aberrant result for the three year period ending 31 December 2011 are potentially explained by the gender-specific trading behaviour in the markets over the same period i.e. bear vs. bull markets.

An analysis of the variances in returns earned by men and women showed that men have statistically significantly greater variances in returns than women for the total sample and in all individual age groupings. Furthermore, older investors had higher variances in return than their younger counterparts.

5.2 Conclusions

For the most part, men are seen to be trading more than women, however, this finding is not consistent amongst men of all ages. No statistically significant difference was found in the absolute returns earned by men and women, barring women over the age of 60 years who are found to outperform men in the majority of the periods examined. Generally, men have statistically significantly greater variance in returns than women, but an anomaly is noted amongst women between the ages of 30 and 40 years who have a statistically significantly greater variance in return than men over the period of 1 January 2007 – 31 December 2009. Furthermore, older investors had higher variances in return than their younger counterparts.

Women over the age of 60 years appear to perform better than men. For the younger age groupings, the same result is inferred, but only on a risk-adjusted basis. An exception is noted for women between the 30 and 40 years of age.

5.3 Recommendations

This study reveals findings regarding men and women of different ages and gender within an emerging market. The finding that men and women of different ages behave differently in their investing decisions is relevant to management who endeavour to advise their clients regarding fund selection and transfers. Generic advice is not appropriate, but rather tailored guidance based on the gender and age of the investor.

Two areas require further analysis. The first relates to the anomaly that was identified in the three-year period ending 31 December 2009, in which women between the age of 30 and 40 years earned statistically significantly higher returns than men, whilst at the same time having greater variances in those returns. The second relates to men earning higher returns during the bull market post the financial crisis of 2008/9. The consideration of whether men perhaps perform better in bull markets and women in bear markets might be considered an explanation, but requires further investigation.

ACKNOWLEDGEMENTS

This publication is based on research that has been supported in part by the University of Cape Town's Research Committee (URC).

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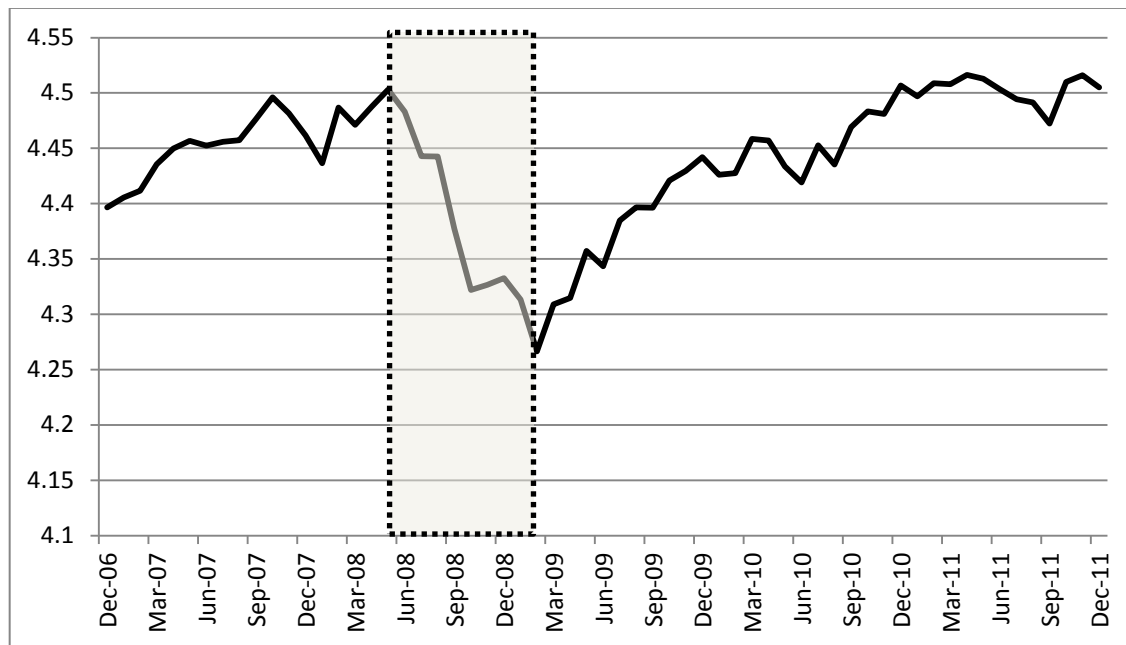
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ANNEXURE 1: JSE ALL SHARE INDEX: 1 JANUARY 2007 – 31 DECEMBER 2011



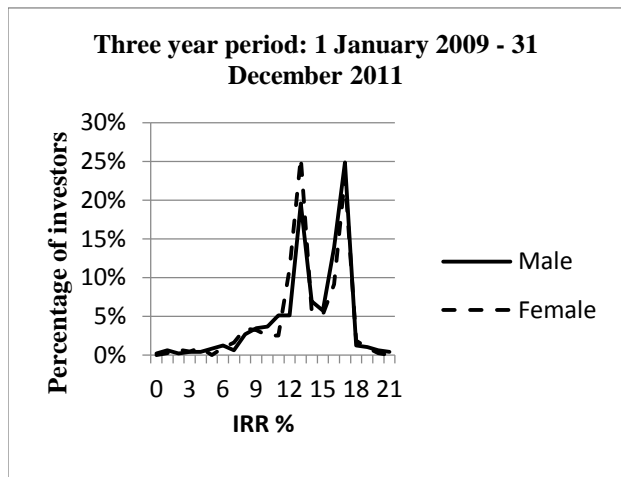
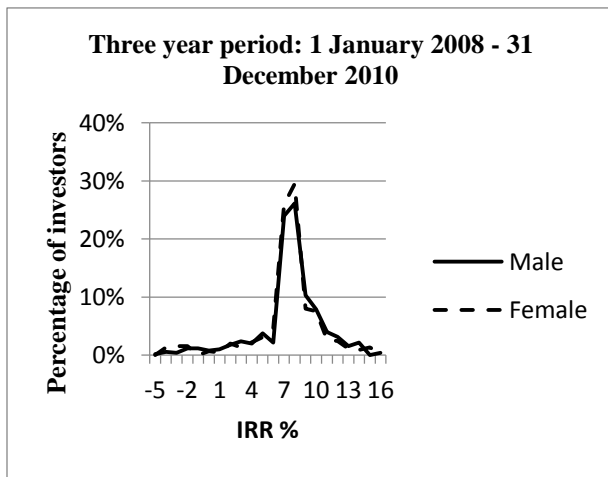
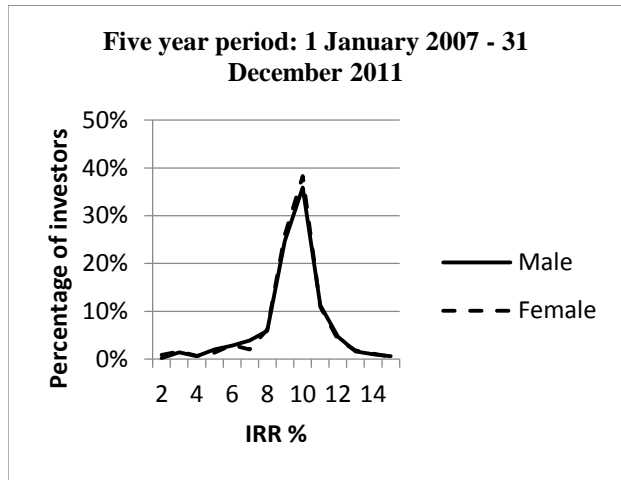
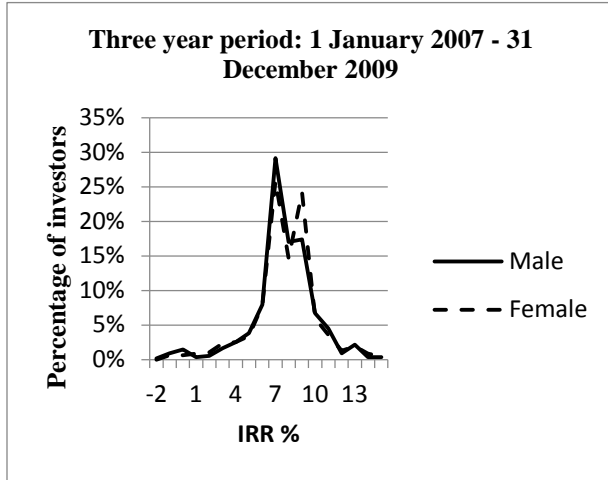
Source: (Willows & West, 2015)

ANNEXURE 2: AGE OF INVESTORS

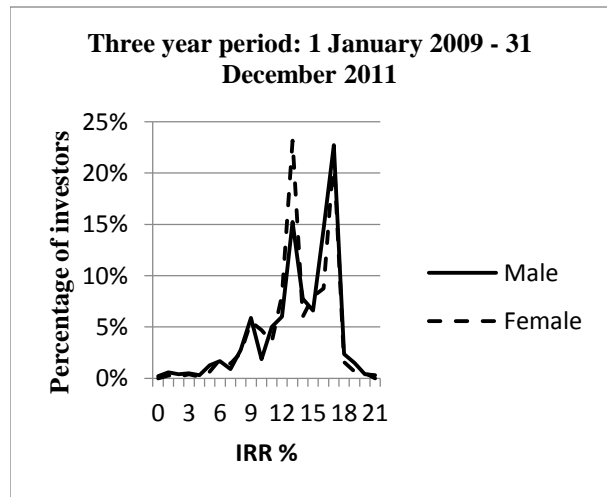
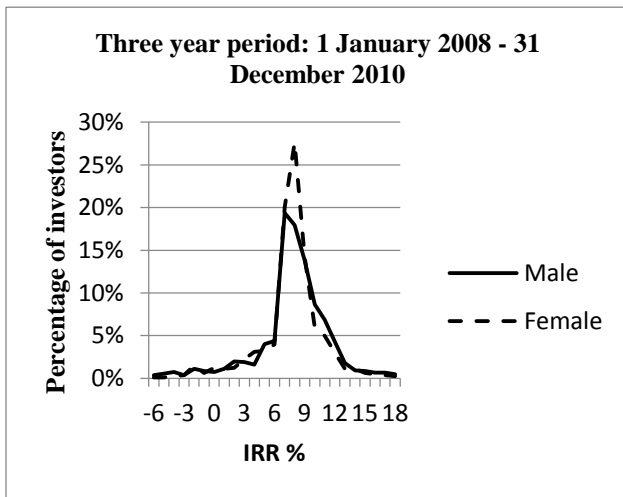
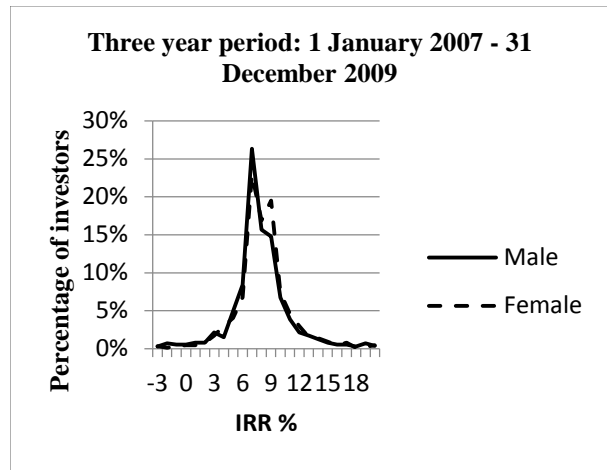
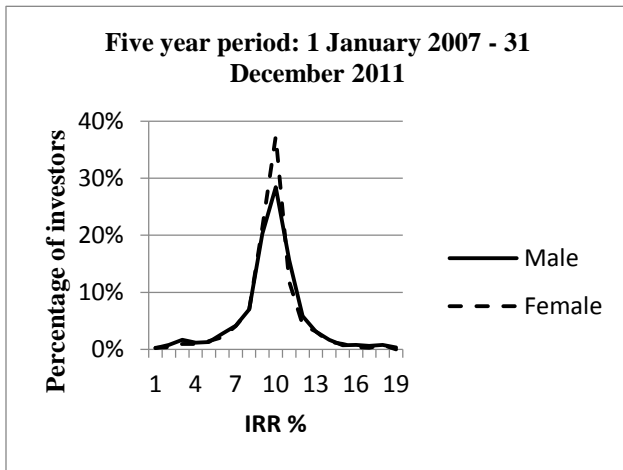
Age Groupings Of Investors			
Age group	Total	Male	Female
Under 20 years of age	7%	7%	8%
Between 20 and 30 years of age	8%	8%	8%
Between 30 and 40 years of age	15%	16%	14%
Between 40 and 50 years of age	15%	15%	14%
Between 50 and 60 years of age	17%	16%	17%
Over 60 years of age	38%	37%	40%

ANNEXURE 3: VISUAL TEST FOR NORMAL DISTRIBUTION

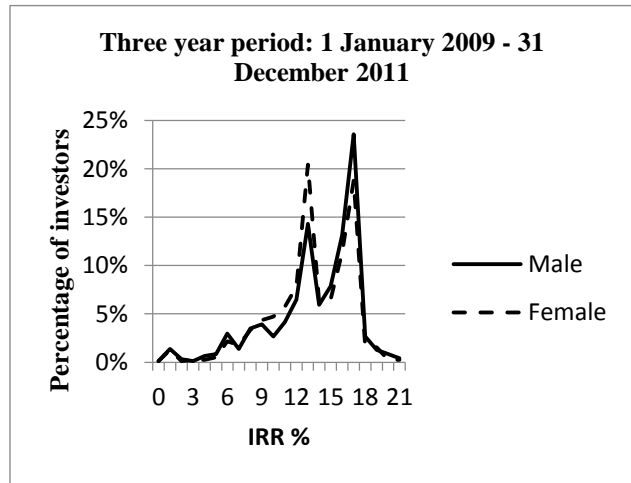
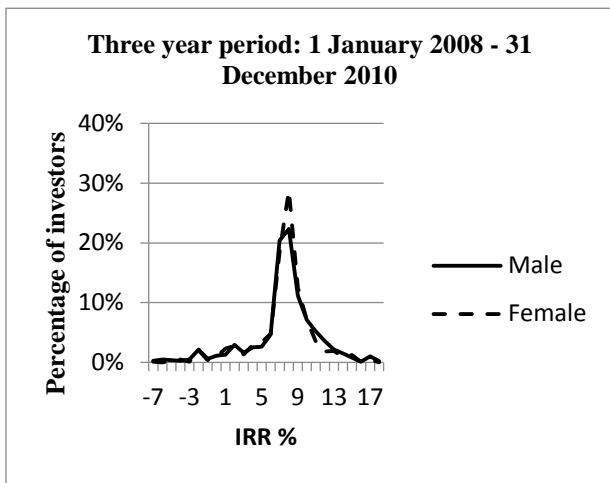
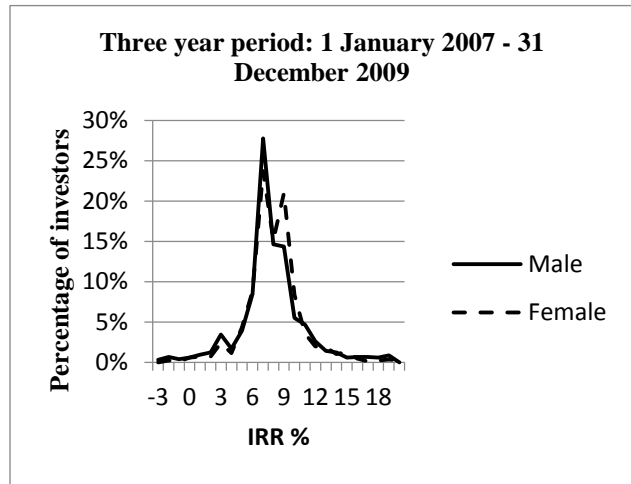
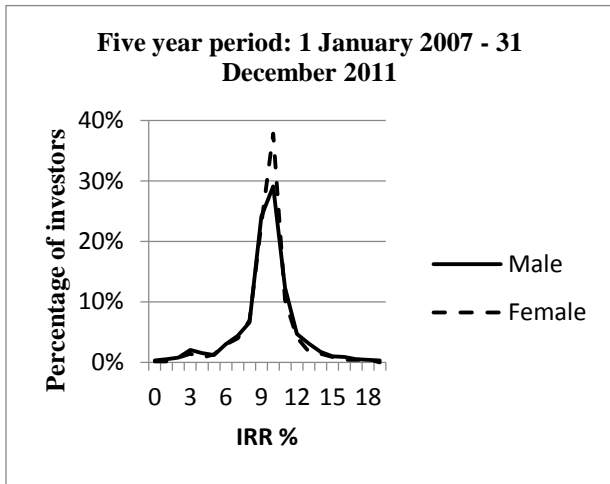
3.1 Investors Between The Ages Of 20 And 30 Years



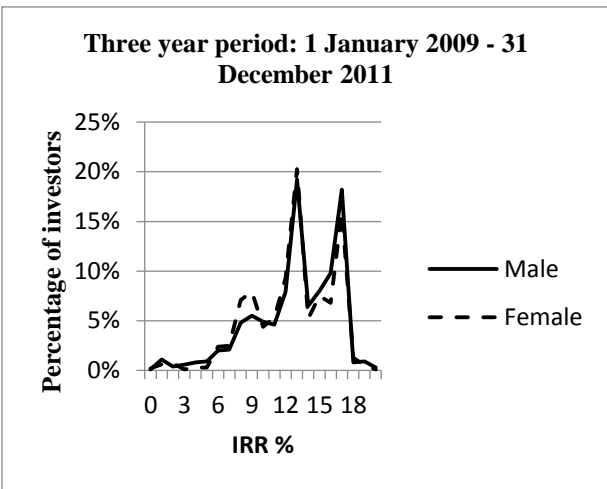
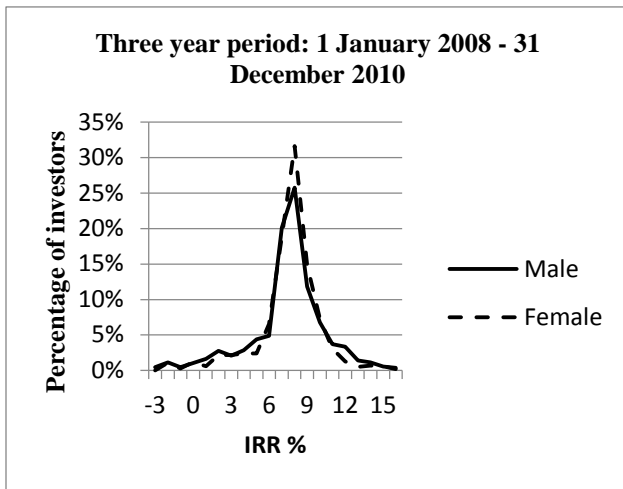
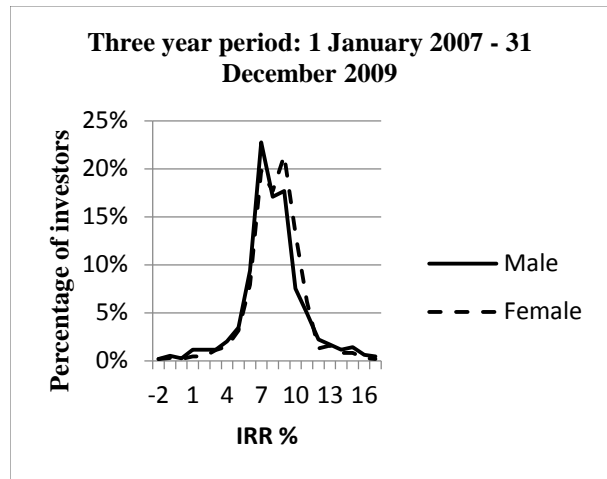
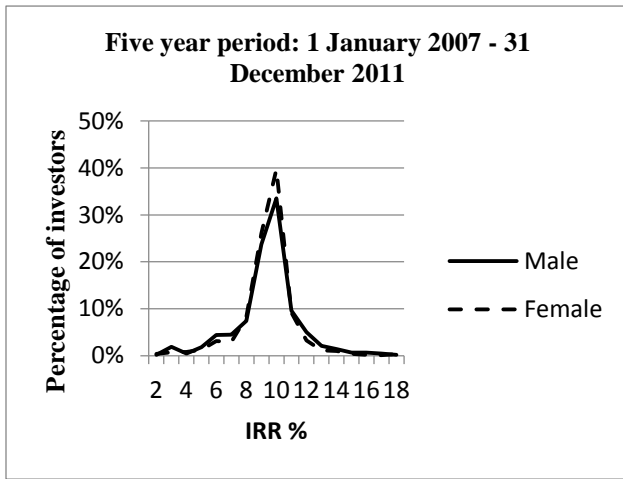
3.2 Investors Between The Ages Of 30 And 40 Years



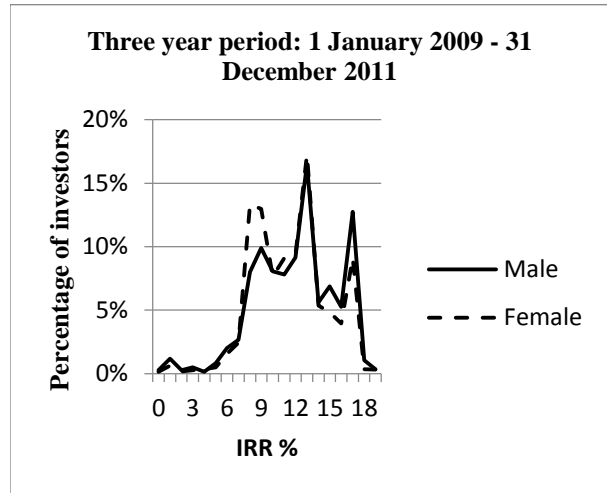
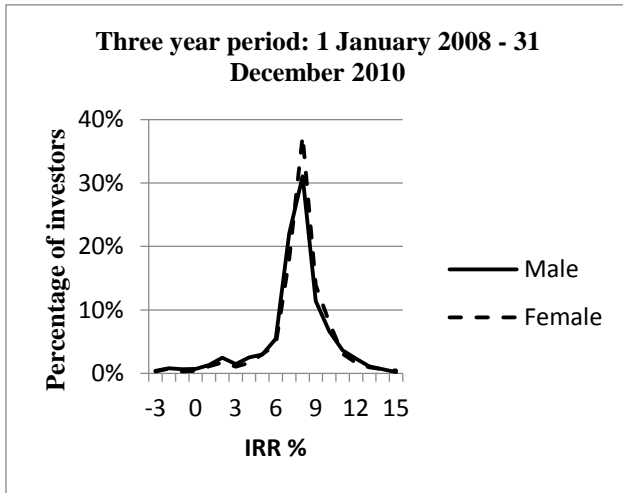
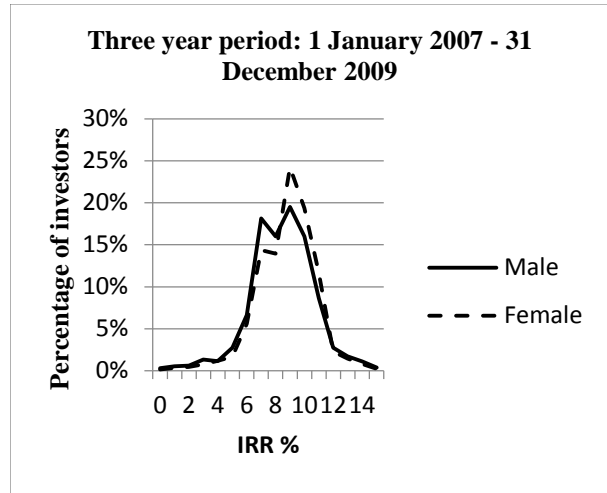
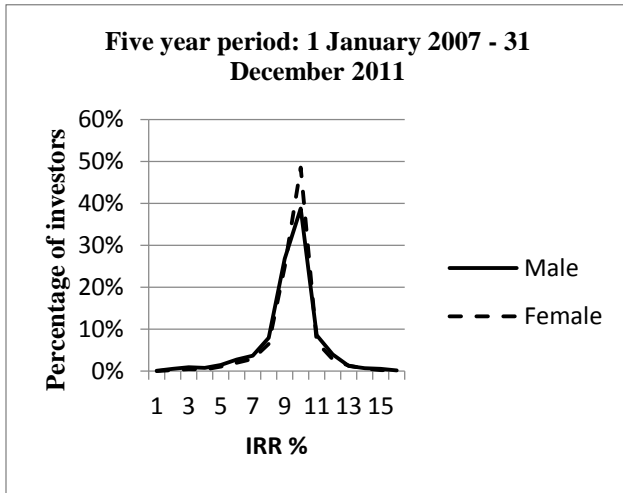
3.3 Investors Between The Ages Of 40 And 50 Years



3.4 Investors between the ages of 50 and 60 years



3.5 Investors Over The Age Of 60 Years



ANNEXURE 4: TOTAL SAMPLE OF INVESTORS (WILLOWS & WEST, 2015)

4.1 Correlation Between Switch Frequency And Return

	Number Of Observations	Spearman’s Rho	P
<i>0 – 6+ switches</i>	11,817	-0.1016	<0.0001

4.2 Two-Sample For Mean Number Of Switches

	Number of observations	Maximum	Mean	Standard deviation	Z^t	P
Men	6,184	84	1.02	4.07		
Women	5,633	68	0.68	2.58		
Total	11,817				3.831 ^w	0.0001

4.3: Two Sample For Mean Return And Variance In Return

		Number of observations	Mean	Z	P	F	P	Variance
5 years:	Men	6,184	9.10					8.76
1 January 2007 –	Women	5,633	9.11					5.4
31 December 2011	Total	11,817		-0.126 ^z	0.45	1.621 ^f	<0.0001	
3 years:	Men	6,988	7.80					15.82
1 January 2007 –	Women	6,305	7.96					12.18
31 December 2009	Total	13,293		-2.573 ^z	0.005	1.299 ^f	<0.0001	
3 years:	Men	6,494	7.03					18.46
1 January 2008 –	Women	5,922	7.11					11.75
31 December 2010	Total	12,416		-1.147 ^z	0.13	1.571 ^f	<0.0001	
3 years:	Men	5,632	12.38					15.93
1 January 2009 –	Women	6,184	11.95					13.14
31 December 2011	Total	11,816		-8.608 ^w	<0.0001	1.212 ^f	<0.0001	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women.

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

ANNEXURE 5: STATISTICAL TESTS: INVESTORS BETWEEN THE AGES OF 20 AND 30 YEARS

5.1 Two Sample For Mean Number Of Switches

	Number Of Observations	Maximum	Mean	Z ^t	P
Men	490	28	0.58		
Women	439	26	0.30		
Total	929			-3.862 ^w	0.0001

5.2 Two-Sample For Mean Return And Variance In Return

		Number Of Observations	Mean	Z	P	F	P	Variance
5 years: 1 January 2007 – 31 December 2011	Men	490	9.16					12.64
	Women	439	8.97					5.61
	Total	929		0.9333 ^z	0.18	2.2555 ^f	<0.0001	
3 years: 1 January 2007 – 31 December 2009	Men	552	7.34					18.84
	Women	471	7.33					8.57
	Total	1,023		1.054 ^w	0.29	2.1968 ^f	<0.0001	
3 years: 1 January 2008 – 31 December 2010	Men	505	6.99					16.47
	Women	451	6.74					16.06
	Total	956		-1.339 ^w	0.18	1.1710 ^f	0.04	
3 years: 1 January 2009 – 31 December 2011	Men	490	13.15					21.00
	Women	439	12.94					12.90
	Total	929		-1.809 ^w	0.07	1.6277 ^f	<0.0001	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

ANNEXURE 6: STATISTICAL TESTS: INVESTORS BETWEEN THE AGES OF 30 AND 40 YEARS

6.1 Two Sample For Mean Number Of Switches

	Number Of Observations	Maximum	Mean	Z^t	P
Men	1,017	84	0.86		
Women	765	41	0.41		
Total	1,782			-1.536 ^w	0.12

6.2: Two-Sample For Mean Return And Variance In Return

		Number Of Observations	Mean	Z	P	F	P	Variance
5 years:	Men	1,017	9.44					15.75
1 January 2007 –	Women	765	9.37					8.59
31 December 2011	Total	1,782		0.3800 ^z	0.35	1.8338 ^f	<0.0001	
3 years:	Men	1,116	7.78					26.07
1 January 2007 –	Women	872	7.93					32.74
31 December 2009	Total	1,988		1.938 ^w	0.05	0.7966 ^f	0.0002	
3 years:	Men	1,053	7.16					29.21
1 January 2008 –	Women	804	7.09					12.41
31 December 2010	Total	1,857		-1.704 ^w	0.09	2.3543 ^f	<0.0001	
3 years:	Men	1,017	13.09					15.61
1 January 2009 –	Women	764	12.89					10.57
31 December 2011	Total	1,781		-2.602 ^w	0.01	1.4766 ^f	<0.0001	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

ANNEXURE 7: STATISTICAL TESTS: INVESTORS BETWEEN THE AGES OF 40 AND 50 YEARS

7.1 Two Sample For Mean Number Of Switches

	Number Of Observations	Maximum	Mean	Z ^t	P
Men	942	70	0.88		
Women	783	42	0.52		
Total	1,725			-1.945 ^w	0.05

7.2 Two-Sample For Mean Return And Variance In Return

		Number Of Observations	Mean	Z	P	F	P	Variance
5 years: 1 January 2007 – 31 December 2011	Men	942	9.07					10.57
	Women	783	9.17					9.53
	Total	1,725		-0.6201 ^z	0.27	1.1084 ^f	0.07	
3 years: 1 January 2007 – 31 December 2009	Men	1,073	7.61					21.01
	Women	872	7.70					13.56
	Total	1,945		2.400 ^w	0.02	1.5487 ^f	<0.0001	
3 years: 1 January 2008 – 31 December 2010	Men	984	6.89					26.01
	Women	821	6.74					15.34
	Total	1,805		-0.956 ^w	0.34	1.6934 ^f	<0.0001	
3 years: 1 January 2009 – 31 December 2011	Men	942	13.06					18.00
	Women	783	12.67					14.09
	Total	1,725		-3.417 ^w	0.0006	1.2779 ^f	0.0002	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

ANNEXURE 8: STATISTICAL TESTS: INVESTORS BETWEEN THE AGES OF 50 AND 60 YEARS

8.1: Two Sample For Mean Number Of Switches

	Number Of Observations	Maximum	Mean	Z^t	P
Men	999	65	1.14		
Women	957	68	0.77		
Total	1,956			-0.811 ^w	0.42

8.2: Two-Sample For Mean Return And Variance In Return

		Number Of Observations	Mean	Z	P	F	P	Variance
5 years: 1 January 2007 – 31 December 2011	Men	999	9.04					7.65
	Women	957	8.96					4.95
	Total	1,956		0.7367 ^z	0.23	1.5468 ^f	<0.0001	
3 years: 1 January 2007 – 31 December 2009	Men	1,129	7.74					17.58
	Women	1,074	7.83					10.15
	Total	2,203		2.818 ^w	0.01	1.7316 ^f	<0.0001	
3 years: 1 January 2008 – 31 December 2010	Men	1,048	6.94					18.72
	Women	1,006	7.00					12.10
	Total	2,054		0.335 ^w	0.74	1.5472 ^f	<0.0001	
3 years: 1 January 2009 – 31 December 2011	Men	999	12.27					15.69
	Women	957	11.88					17.38
	Total	1,956		-2.681 ^w	0.01	0.9024 ^f	0.05	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

ANNEXURE 9: STATISTICAL TESTS: INVESTORS OVER THE AGE OF 60 YEARS

9.1 Two Sample For Mean Number Of Switches

	Number Of Observations	Maximum	Mean	Z ^t	P
Men	2,284	55	1.34		
Women	2,258	66	0.93		
Total	4,542			-2.783 ^w	0.01

9.2 Two-Sample For Mean Return And Variance In Return

		Number Of Observations	Mean	Z	P	F	P	Variance
5 years: 1 January 2007 – 31 December 2011	Men	2,284	8.93					5.74
	Women	2,258	9.08					3.47
	Total	4,542		-2.3344 ^z	0.01	1.6556 ^f	<0.0001	
3 years: 1 January 2007 – 31 December 2009	Men	2,621	8.09					9.54
	Women	2,558	8.36					7.08
	Total	5,179		5.799 ^w	<0.0001	1.3473 ^f	<0.0001	
3 years: 1 January 2008 – 31 December 2010	Men	2,428	6.95					13.24
	Women	2,397	7.30					10.42
	Total	4,825		-4.0377 ^z	<0.0001	1.2700 ^f	<0.0001	
3 years: 1 January 2009 – 31 December 2011	Men	2,284	11.42					13.99
	Women	2,258	10.95					10.50
	Total	4,542		-6.092 ^w	<0.0001	1.3322 ^f	<0.0001	

^t An unpaired z-test with one tail will be performed as the numbers of data points within the two samples being compared are different and we expect the mean to move in only one direction i.e. men to trade more than women

^w Calculated using Wilcoxon rank-sum test which is a two-tailed test

^z Calculated using an unpaired z-test (Alternate hypothesis being that women earn higher returns than men)

^f Calculated using F-test

NOTES