Does Financial Risk Tolerance Change Over Time?

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Abstract

Academics are divided as to whether risk tolerance is a genetic and enduring personality trait and as a consequence is less likely to change over the life of an individual or, as with some personality traits such as attitudes and emotions, can indeed change over time as it is influenced by life experiences. In this study we report the findings of a longitudinal study that investigates the change in financial risk tolerance scores of individuals over a five year period and the factors that influence such change. Our results indicate a relatively small change in individuals' financial risk tolerance over time. We find a slight decrease in financial risk tolerance associated with a decrease in household size and after terminating the services of a financial planner. From our results we propose that financial risk tolerance is a stable personality trait and is unlikely to change substantially over the life of an individual.

JEL Classifications: D14; D81; D91

Keywords: Financial Risk Tolerance; Risk Assessment; Financial Planning; Longitudinal Study

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1. Introduction

Since the development of financial risk tolerance assessment methodologies, academics have attempted to determine the extent to which various demographic, socio-economic and psychological factors are related to the financial risk tolerance of individuals. There appears to be significant agreement among research studies that financial risk tolerance is statistically related to a number of broad factors such as gender, age, income, wealth, education, and occupation. However, one of the major unanswered questions in financial risk tolerance studies is: Does an individual's financial risk tolerance change over time and which factors influence this change?

According to Hanna and Chen (1997), financial risk tolerance is a subjective attribute and as such is generally believed to be a genetic predisposition. As an attitude towards risk it refers to the level of financial risk that an individual *prefers* to accept, in other words a feeling towards risk. As is the case with other enduring personality traits such as intelligence, values and personality it is thus less likely to change over the life of an individual. Other academics, including Cordell (2001), have challenged this view by contending that, as with some personality traits such as emotions and attitudes, an individual's financial risk tolerance most likely can change over time as it is influenced by external factors such as major life experiences and contact with relatives or friends.

Alternatively, both arguments seem reasonable as a number of personality and psychological traits appear to be influenced by both nature (genetics) and nurture (life experience). To address this issue this paper analyzes survey data completed by individuals over a five year period and through a longitudinal analysis, determines if individual respondents' financial risk tolerance changes over time and most importantly, which factors might influence a change in financial risk tolerance.

2. Literature Review

Although academic studies have illustrated the relationship between financial risk tolerance and a substantial number of factors, the following literature review provides an overview of the factors limited to the longitudinal surveys used in this study. Additionally, a number of

factors such as gender and race which, although significantly related to financial risk tolerance, are not addressed in this study as they have no to little likelihood of changing over the lifetime of an individual. Finally, the literature review only contains questionnaire-based survey studies[1] which consequently relates to attitudes towards financial risk tolerance.

A common heuristic belief is that financial risk tolerance decreases with age and as such it is the most investigated factor, with a large number of studies reporting significantly higher risk tolerance for younger individuals (Chaulk, Johnson & Bulcroft, 2003; Donkers & Van Soest, 1999; Fan & Xiao, 2006; Hallahan, Faff & McKenzie, 2004; Sung & Hanna, 1996a; Xiao, Alhabeeb, Hong & Haynes, 2000 and Yao, Hanna & Lindamood, 2004).

Financial risk tolerance also appears to be higher for single individuals who are hypothesized to have fewer responsibilities and less to lose by accepting greater financial risks (Fan & Xiao, 2006; Grable & Joo, 2004; Hallahan, Faff & McKenzie, 2004; Hawley & Fujii, 1993 and Yao, Hanna & Lindamood, 2004). Through their family development theory, Chaulk, Johnson and Bulcroft (2003) theorize that once individuals marry their financial risk tolerance decreases due to a greater need for protection of wealth for future consumption such as children or housing. Related to this theory, several studies furthermore report a negative relationship between financial risk tolerance and number of dependants (Chaulk, Johnson & Bulcroft, 2003; Grable & Joo, 1999 and Hallahan, Faff & McKenzie, 2004).

A significant number of studies reports high risk tolerance for individuals in high income and wealth categories (Chang, DeVaney & Chiremba, 2004; Chaulk, Johnson & Bulcroft, 2003; Fan & Xiao, 2006; Grable, 2000; Grable & Joo, 1999 & 2004; Grable, Lytton & O'Neill, 2004; Hallahan, Faff & McKenzie, 2004; Sung & Hanna, 1996a & 1996b; Yao, Hanna & Lindamood, 2004 and Yook & Everett, 2003). However, there is some evidence to suggest that the relationship between wealth and income and financial risk tolerance may be non-linear (Hallahan, Faff and McKenzie, 2004).

Several studies report a general positive relationship between financial risk tolerance and education (Chang, DeVaney & Chiremba, 2004; Fan & Xiao, 2006; Grable, 2000; Grable & Joo, 1999 & 2004; Hallahan, Faff & McKenzie, 2004; Hawley & Fujii, 1993; Sung & Hanna, 1996a & 1996b and Yao, Hanna & Lindamood, 2004). Furthermore, some studies differentiate between specific education levels. For example, Hallahan, Faff and McKenzie (2004) report that at least a trade or tertiary diploma level of education is required before a

[1] Grable and Lytton (1999) suggest that the most widely accepted method of gauging an individual's financial risk tolerance level is to use a psychometric based assessment instrument that measures subjective risk tolerance attitudes through 'multidimensional financial scenarios and situations'.

statistically significant increase in financial risk tolerance scores are observed. The authors also find a high positive correlation between income, wealth and education. For example, they report that half of all the millionaires in their study have a university education. In contrast, 35 percent of respondents in the lowest wealth category of their survey did not complete high school. These strong correlations might suggest that financial risk tolerance attitudes are actually a function of income and wealth rather than education.

Although no questionnaire-based survey study could be located that investigates the relationship between financial risk tolerance and geographical location, the choice dilemma study[2] of Barsky, Juster, Kimball and Shapiro (1997) reports a statistically significant difference in the risk tolerance preferences of individuals residing in the western United States compared to any other part of the country. Riley and Chow (1992) suggest that the geographical grouping of individuals according to income and wealth is the most likely explanation behind this finding.

In recent years an interesting school of thought has emerged linking financial risk tolerance to historical investment market performance. Nofsinger (2005) notes that individuals often accept gambles directly after they have won money and likewise become less willing to accept risks after experiencing a financial loss. This explains investors' inclination to buy risky stocks after terminating a successful position in an effort to minimize the regret of potentially missing out on a major bull market. Grable, Lytton and O'Neill (2004) cite momentum investors' purchasing of risky investments during upturning markets as an example of this behavioral bias. The authors report a significant relationship between financial risk tolerance and positive short-term investment performance as measured by three financial market indices.

The only study to investigate actual *changes* in financial risk tolerance scores of individuals is the comprehensive eighteen year longitudinal study by Yao, Hanna and Lindamood (2004). The focus of their research is to evaluate the overall level of risk tolerance of six Survey of Consumer Finances (SCF) datasets between 1983 and 2001 and to deduce from their analysis whether any factors influenced a change in the average risk tolerance of the general population over this time period.[3] The authors report fluctuating

[2] In these financial risk tolerance assessments, favoured by behavioural economists in the 1970s and 1980s, respondents are required to make a financially motivated risk choice or a so-called 'choice dilemma' for a series of daily life events. The most popular choice dilemma method during that time was the Kogan-Wallach Choice Dilemmas Questionnaire where respondents are subjected to twelve 'everyday life situations' and required to indicate the level of risk he or she wishes to take in pursuing a desired goal (Kogan and Wallach 1964).

[3] Researchers using SCF datasets do not have access to the identity of individuals and consequently are not able to identify individual respondents who completed the survey in multiple years. This implies that changes to individual financial risk tolerance scores cannot be analyzed on a micro level.

levels of risk tolerance scores and attribute this mainly to changes in recent events, primarily changes in stock market returns. They report an increase in financial risk tolerance scores during bull markets and a subsequent decrease during bear markets.

No questionnaire-based survey study investigates the relationship between financial risk tolerance and consulting of a financial planner. However, using an objective measure[4], Bernasek and Shwiff (2001) reports that individuals generally tend to increase the risk level of their retirement savings after they have consulted a financial planner. Finally, Grable (2000) reports that individuals with positive economic expectations have higher financial risk tolerance scores than those with less positive expectations. Grable and Joo (2000) also find a positive coefficient for five year economic expectations, but their results are not statistically significant.

3. Survey Design

In 1997 FinaMetrica Pty Limited[5] (formerly ProQuest), an Australian-based risk-profiling company, developed a valid and reliable 25-question psychometric financial risk assessment test in conjunction with the Applied Psychology Unit of the University of New South Wales School of Psychology. Since its launch in Australia in 1998, United States in 2002 and United Kingdom in 2004, FinaMetrica has used its web-based risk profiling system to profile in excess of 200,000 individuals worldwide. If it is accepted that financial risk tolerance is indeed a personality trait that distinguishes individuals from each other, its measurement can be equated to an IQ test, which also has no discrete unit of measurement such as weight or height. Whichever assessment method or instrument researchers use, the final result will lead to the measurement of financial risk tolerance as a relative measure where individuals are simply differentiated on the basis of the amount of financial risk that they are willing to accept.

Each year between 2002 and 2006, an Australian magazine, Smart Investor (and its predecessor Personal Investor Magazine) and FinaMetrica, have conducted an Investor Survey that coincides with the January issue of the Smart Investor magazine. Readers were invited to participate in the survey at the Smart Investor website. The survey asks about

[4] Objective measures entail a quantitative inference of an individual's relative risk tolerance from the amount of actual risky assets held in their portfolio in relation to total portfolio wealth. Asset allocation is thus used as a proxy for financial risk tolerance. This method of measuring financial risk tolerance is however questionable as it measures financial risk *behaviour* and does not necessarily relate to an *attitude* towards risk.

[5] More information about the FinaMetrica risk profiling system is available from their website at www.finametrica.com.

participants' financial attitudes, views, experiences and intentions. The first half of the questionnaire has asked similar questions each year thus providing the ability to do year-on-year comparisons, in addition to analysis of the particular year's answers. The second half of the questionnaire addresses one or more topical issues-of-the-day such as selection of a specific retirement fund after deregulation of the industry in Australia. At the completion of the survey, participants were also given the opportunity to complete the FinaMetrica financial risk profile for free. In addition to risk profiling, the FinaMetrica questionnaire also gathers information on standard demographic variables. The number of questions on the combined FinaMetrica and Smart Investor magazine surveys varied between 35 and 74. Only a limited number of questions appeared on all five years' surveys.

FinaMetrica provided us with the combined survey responses across the five years for each survey participant with all identifying information withheld. The five combined surveys consist of financial risk tolerance scores and associated demographic, socio-economic and attitudinal variables. A total of 4,208 individuals completed all surveys, but as can be expected in survey research, a number of respondents did not complete all the questions. As a consequence, a final sample size of 3,234 usable responses was recorded for the five years between 2002 and 2006.

Insert Table 1 about here

Table 1 reports that the average age of respondents is 47.85 years and married individuals constitute the majority (86 percent) of the sample. Approximately two-thirds (65 percent) of respondents have a university degree or higher qualification. The average personal before-tax income is approximately $50,000 per annum, with a household net wealth of approximately $300,000 per respondent. Not surprisingly, the majority of respondents (79 percent) were located in and around Australia's three largest cities of Sydney, Melbourne and Brisbane.

The purpose of this longitudinal study is not to comment on the average risk tolerance scores of the five surveys, but to analyze changes in individuals' financial risk tolerance scores over time. A limited number of respondents completed The Smart Investor Magazine and FinaMetrica surveys in multiple years. Their identity was recorded every year by means of their email addresses which were used to provide feedback to respondents on their individual financial risk tolerance score once they completed the FinaMetrica survey. When FinaMetrica provided us with the survey dataset, they substituted the identifying email

addresses with a unique code for each respondent to ensure their confidentiality. This procedure allowed us to link and separate respondents who completed the surveys in multiple years.

A total of 372 respondents who completed multiple surveys between 2002 and 2006 form the sample for the longitudinal analysis. The majority of these (79 percent) completed the survey one year apart, with the remainder leaving a gap longer than one year between surveys. Where individuals completed more than two surveys, they were treated as separate respondents. For example, if a respondent completed the 2002, 2003 and 2004 surveys, the data was treated as if completed by two respondents (2002 to 2003 and 2003 to 2004).

4. Analysis of Results

Figure 1 illustrates the distribution of changes in financial risk tolerance scores for the 295 respondents that completed the survey one year apart. Although the total sample of 372 is used for the main regression analysis of this study, Figure 1 graphs only one-year financial risk tolerance changes due to the probability of larger changes over longer time periods. The change in financial risk tolerance appears to have a normal distribution. The largest one-year decrease is 16 points, with a largest increase of 17 points. The average one-year change is +0.29 points, the median change is zero and the standard deviation is 5.80 points.

Insert Figure 1 about here

A regression model is developed to investigate the influence of a change in factors on the change in financial risk tolerance scores. For each of the 372 respondents, a dependent variable (ΔRTS) is calculated as the change in financial risk tolerance scores between two survey dates. The independent variables are limited to questions that were used in all five surveys, as well as variables that could actually change over time. This excludes variables such as gender. Table 2 provides a description of the independent variables used in the longitudinal regression analysis. The majority of variables are coded as dummy variables to indicate an increase or decrease in the independent variable. For example ΔINCOMEpos indicates an increase in individual income between survey dates. We did not incorporate the magnitude of change as we simply aim to determine the direction of change and its subsequent influence on financial risk tolerance. The default individual in the regression equation is a person whose factors remain unchanged during two sample dates.

Insert Table 2 about here

A regression model was developed from the variables listed in Table 2. The regression model contains a set of predictors and presents a quantification of the relationship between each of the changes in independent characteristics and change in financial risk tolerance according to the following condition[6]:

$$\Delta RTS_x = \alpha_0 + \alpha_1 \Delta AGE_x + \alpha_2 \Delta MARITALmar_x + \ldots + \alpha_n \Delta INDEX_x + \varepsilon_x$$

where ΔRTS_x is the derived change in financial risk tolerance score for respondent *x* between two survey dates.

Insert Table 3 about here

The results from the regression analysis are provided in Table 3. The small annual change in average financial risk tolerance scores are not very well explained by the regression model as is evident from the adjusted R^2 value of 0.0040. Only two independent variables are significant at the ten percent level.

The negative coefficient for the variable ΔDEPENDANTSneg indicates that a decrease of one dependant causes an individual's financial risk tolerance score to decrease by 1.5103 points. This finding is interesting as academic studies have previously determined lower financial risk tolerance levels for individuals with more dependents.

The negative coefficient for the variable ΔPLANNERneg indicates that a respondent's financial risk tolerance will decrease as the respondent terminates the services of a financial planner. It was reported that Bernasek and Shwiff (2001) found an increase the risk level of individuals' retirement savings after they have consulted a financial planner. Our results now confirm that there is a decrease in financial risk tolerance for individuals after they terminate the services of a financial planner.

[6] The regression equation is condensed due to the large number of independent variables.

5. Summary and Conclusion

In this paper we analyze the 2002 to 2006 Smart Investor Survey dataset by means of a longitudinal analysis. This data contains individual survey results that are able to be tracked across years giving us the first glimpse at how individual investors' risk preferences change over time. In this paper we are able to provide a better understanding of the factors that are related to individuals' financial risk preferences, thereby enabling financial planners and other financial professionals the ability to develop unique and optimal asset allocations for individual clients, based in part on the financial risk tolerance profile of the individual.

There are a number of conclusions obtained when examining changes in financial risk tolerance over time. First, changes in financial risk tolerance appear normally distributed with an average one-year change of 0.29 points and a median of zero. This minimal change supports the theory of Hanna and Chen (1997) that financial risk tolerance is a genetic and predispositional stable personality trait and is unlikely to change over the life of an individual.

Second, two factors are found to be significant at explaining a decrease in financial risk tolerance over time: a decrease in household size and terminating the services of a financial planner. We propose that the minimal changes in financial risk tolerance over time are driven by external influences. This conclusion is supported by the theory of Cordell (2001) that, as with other personality traits such as attitudes and emotions, an individual's risk tolerance attitude can change over time as it is influenced by experience and contact with friends and relatives.

We have identified a number of areas for future research that have come from this longitudinal study. First, longer periods may be needed to identify more substantial attitudinal changes towards risk. Second, underlying economy wide changes may influence individual investors so it will be useful to include recessionary periods in order to assess individuals risk changes.

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Figure 1 Distribution of One-year Changes in Financial Risk Tolerance Scores

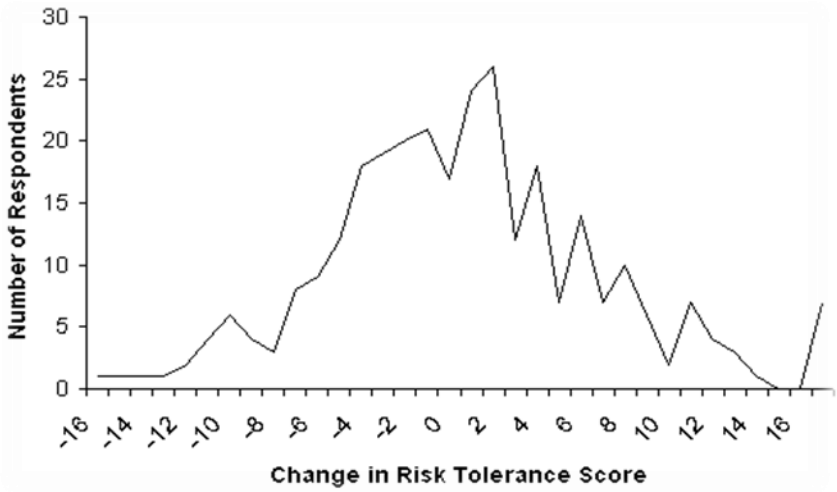

Table 1 Summary of the FinaMetrica and Smart Investor Magazine Dataset

This table provides summary statistics of the FinaMetrica and Smart Investor magazine surveys over the five year period between 2002 and 2006. (1) Percent of sample (2) Measured on a five point scale (1 = under $30,000 to 5 = over $200,000) (3) Measured on a ten point scale (1 = under $10,000 to 10 = over $2,500,000) (4) The original FinaMetrica dataset consisted of postcodes which we subsequently categorized by Australian states.

Variable	**2002 n = 200**	**2003 n = 908**	**2004 n = 574**	**2005 n = 891**	**2006 n = 661**	**Combined n = 3,234**
Risk Tolerance Score: Mean	66.66	63.21	62.80	63.62	61.29	63.52
Std dev	11.21	9.88	11.35	10.42	11.44	10.86
	39 (20%)(1)	166 (18%)	134 (23%)	143 (16%)	132 (20%)	614 (19%)
Age in Years (mean)	45.12	45.22	49.19	50.92	48.80	47.85
Marital Status: Married	158 (79%)	673 (74%)	457 (80%)	870 (98%)	634 (96%)	2,792 (86%)
Single	42 (21%)	235 (26%)	117 (20%)	21 (2%)	27 (4%)	442 (14%)
Number of Dependants (mean)	1.30	1.30	1.23	1.89	1.48	1.44
Education: No High School	6 (3%)	45 (5%)	37 (6%)	33 (4%)	23 (3%)	144 (4%)
High School	21 (10%)	101 (11%)	55 (10%)	82 (9%)	60 (9%)	319 (10%)
Trade / Diploma	39 (20%)	198 (22%)	115 (20%)	196 (22%)	136 (21%)	684 (21%)
University	134 (67%)	564 (62%)	367 (64%)	580 (65%)	442 (67%)	2,087 (65%)
Personal Income (mean)(2)	2.97	2.91	2.81	3.12	3.13	2.99
Household Net Wealth (mean)(3)	6.81	6.32	7.34	7.92	7.63	7.20
Location: New South Wales (4)	57 (29%)	299 (33%)	256 (44%)	306 (34%)	273 (41%)	1,191 (37%)
Victoria	34 (17%)	228 (25%)	163 (28%)	236 (27%)	155 (24%)	816 (25%)
Queensland	28 (14%)	162 (18%)	73 (13%)	172 (19%)	99 (15%)	534 (17%)
South Australia	12 (6%)	60 (7%)	28 (5%)	49 (6%)	40 (6%)	189 (6%)
Western Australia	16 (8%)	90 (10%)	27 (5%)	75 (8%)	60 (9%)	268 (8%)
Other	53 (26%)	69 (7%)	27 (5%)	53 (6%)	34 (5%)	236 (7%)
Use a Financial Planner	74 (37%)	266 (29%)	157 (27%)	244 (27%)	153 (23%)	894 (28%)
Investment Market Expectations:						
Better	40 (20%)	141 (16%)	211 (37%)	152 (17%)	155 (23%)	699 (22%)
Same	111 (55%)	518 (57%)	326 (57%)	631 (71%)	448 (68%)	2,034 (63%)
Worse	49 (25%)	249 (27%)	37 (6%)	108 (12%)	58 (9%)	501 (15%)

Table 2 Definitions of Independent Variables

This table describes the independent variables used in the regression model.

Code	Definition
ΔAGE	Increase in age (in years). This is calculated as the difference between the survey dates.
ΔMARITAL	Dummy variable ΔMARITALmar indicates that a previously single respondent is now married or in a de facto relationship and dummy variable ΔMARITALsep indicates that a previously married or in a de facto relationship respondent is now single.
ΔDEPENDANTS	Dependants are defined as family members whom are either partially or fully financially dependent on the respondent. Dummy variable ΔDEPENDANTSpos indicates an increase in number of dependants between survey dates and dummy variable ΔDEPENDANTSneg indicates a decrease in number of dependants between survey dates.
ΔEDUCATION	Dummy variable that indicates if an individual has increased their level of education to completed high school, trade or diploma, university degree or higher qualification.
ΔINCOME	Dummy variable ΔINCOMEpos indicates an increase in individual income between survey dates. Dummy variable ΔINCOMEneg indicates a decrease in individual income between survey dates.
ΔWEALTH	Dummy variable ΔWEALTHpos indicates an increase in combined household net assets between survey dates. Dummy variable ΔWEALTHneg indicates a decrease in combined household net assets between survey dates.
ΔLOCATION	Dummy variable that indicates if a respondent has moved residency between two survey dates. Change in residency is measured by a self reported change in postcode.
ΔPLANNER	Dummy variable ΔPLANNERpos signifies that a respondent has started to use the services of a financial planner between individual survey dates. Dummy variable ΔPLANNERneg signifies that a respondent has terminated the services of a financial planner between individual survey dates.
ΔEXPECTATION	Dummy variable ΔEXPECTATIONpos signifies that a respondent's expectations in relation to the performance of investment markets over the next year have increased from 'same as long term averages' to 'better than long term averages'. Dummy variable ΔEXPECTATIONneg signifies that a respondent's expectations in relation to the performance of investment markets over the next year have decreased from 'same as long term averages' to 'worse than long term averages'.
ΔINDEX	Indicates the percentage change in index values between survey dates. The S&P/ASX 200 Index[7] levels as measured on 31 January of each survey year was 2006: 4929.6; 2005: 4107.3; 2004: 3272; 2003: 2956.9 and 2002: 3464.2

[7] Covering approximately 78% of the Australian equities market, the S&P/ASX 200 is the primary performance benchmark.

Table 3 Regression of Change in Financial Risk Tolerance Scores (2002 – 2006)

This table provides the results from the regression analysis for a change in risk tolerance scores over the five sampled years between 2002 and 2006. A number of the independent variables were dummy coded and entered as separate sets of predictors. *Notes:* $^{*}p < 0.10$. $R^2 = 0.0469$ and Adjusted $R^2 = 0.0040$. F stat = 1.0922 (P value = 0.3607)

Variable	Coefficient	Std. Error	*t* statistic	P value
α_0	-0.4213	0.9244	-0.4558	0.6488
ΔAGE	1.4672	1.1555	1.2697	0.2050
ΔDEPENDANTSpos	0.5319	0.8930	0.5956	0.5518
ΔDEPENDANTSneg	-1.5103	0.8600	-1.7562	0.0799*
ΔLOCATION	0.0551	0.9791	0.0562	0.9552
ΔPLANNERpos	-1.3199	1.2665	-1.0422	0.2980
ΔPLANNERneg	1.8275	1.0625	1.7200	0.0863*
ΔEDUCATION	-1.2387	1.8778	-0.6597	0.5099
ΔMARITALmar	-2.5398	2.2206	-1.1437	0.2535
ΔMARITALsep	-2.8392	4.3189	-0.6574	0.5113
ΔINCOMEpos	-0.2377	0.8868	-0.2680	0.7888
ΔINCOMEneg	0.1429	0.9563	0.1494	0.8813
ΔWEALTHpos	-0.7297	0.7017	-1.0398	0.2991
ΔWEALTHneg	-0.8438	1.2051	-0.7002	0.4843
ΔEXPECTATIONpos	-0.4081	0.7465	-0.5467	0.5849
ΔEXPECTATIONneg	0.8004	0.9017	0.8877	0.3753
ΔINDEX	-1.2818	4.4568	-0.2876	0.7738