

Correlates of Stock Market Investment

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Abstract

In this study we were concerned with the correlates of stock market participation (SMP). In all, 1202 working adults indicated whether or not they invested in the stock market, and which was split almost equally between those that did, and did not. We were interested in the extent to which their demography (age, sex, education), self-assessed wealth, as well as personality traits predicted their participation. We used a six-factor robust measure of work personality (HPTI). Correlational analysis indicated that the strongest correlation of SMP were wealth, sex, age and trait Risk Tolerance. We then did a binary logistic regression which indicated that being male increased the odds of having invested in the stock market by 91%, and an increase of one year in age increased the odds by 3%. Ambiguity Acceptance and trait Competitiveness were among the HPTI personality variables that were significant predictors of stock market investment. Implications and limitations are acknowledged.

Key Words: Stock Market; Investment; Personality; Gender

Introduction

There is a great deal of interest in personality and individual difference correlates of money-related behaviour including financial literacy, spending and saving, wealth accumulation and investing (Ben-Shahar & Golan, 2014; Exley et al., 2022; Fenton-O’Creevy & Furnham, 2020ab, 2023; Furnham & Grover, 2022; Furnham et al., 2022; Holmén, et al., 2021; Sesini & Lozza, 2023). These studies have identified certain traits like Conscientiousness which is systematically related to a number of financial behaviours. Indeed, in an important recent study Giannelis et al. (2023) assessed impulsivity and irresponsibility in a sample of 3,920 American twins and related this to a measure of saving disposition and financial distress and concluded that 44% of the covariance between the two financial behaviours is due to genetic effects.

This study focused on the personal correlates of whether people do, or do not, participate in the stock market (SMP) (Fiagbenu, 2022). Ng et al. (2005) suggested personality traits are related with self-perceptions of success while demographic variables predict better objective success. Thus, personality variables may relate to the self-confidence of succeeding in stock-market speculation but demography about actually making money.

The issue of SMP is potentially of interest to financial planners and advisers in understanding their clients and giving them advice. People take an interest in, as well as get involved in, stock market transactions for a variety of reasons. Apart from those that work in the financial industry, buying and selling stocks and shares are seen by some as a very sensible way to invest their assets and increase their wealth, while others see it little more than an amusement and a sort of reckless gambling. There is a limited literature on beliefs about the stock market

including studies about fear of it (Lim & Kin, 2018) as well as conspiracy theories about how it functions (Fiagbenu, 2022).

Researchers have been interested in a number of individual difference variables and SMP, as well as which variables best predict success in terms of money made (Conlin et al., 2015; Conlin & Miettunen, 2017; Firth et al., 2023; Grinblatt et al., 2010; Hii et al., 2022). These include sex, age, education, intelligence and financial literacy. Whilst there are differences between studies there seems to be systematic evidence that males more than females, and older rather than younger people tend to SMP. The data also suggest, as expected, that it is better educated and wealthier people who are more likely to speculate on the stock market (Vissing-Jorgensen, 2003). Others have been interested particularly in the correlates of successful investing.

Inevitably risk aversion is associated with low SMP (Bockerman et al., 2019). Hong et al., (2005) based on their theory of social interaction those who interact with their neighbours, or attend church are substantially more likely to invest in the market than non-social households, controlling for wealth, race, education, and risk tolerance (Talpsepp et al., 2020).

Personality and SMP

In this study we are particularly interested in the incremental predictive validity of personality traits after taking account of demographic variables. In a study of 1600 Finish adults' SMP Conlin et al., (2015) used the temperament trait and subscale scores from Cloninger et al.'s (1993) *Temperament and Character Inventory*. They found that exploratory excitability, extravagance, harm-avoidance, sentimentality and persistence were consistently related to SMP across time periods and varying model specifications. They also found that fear of uncertainty was

negatively related to SMP, albeit weakly. Their data suggested that personality traits' relationship with SMP is robust to the inclusion of both risk aversion and wealth.

In a salient study of 7784 Americans, Bucciol and Zarri (2017) looked at Big Five traits and facets and SMP. Their central concern was the role of non-cognitive factors such as how investors' personality attributes significantly shape their portfolio choices. They found three traits (Agreeableness, Cynical Hostility and Anxiety) had a significant negative correlation with financial risk taking, as measured by the holding, and the amount, of stock assets.

In an important study of over 200,000 Estonian adults Vaarmets et al. (2019) found stock market investors tend to be more ambitious, more prone to risk and more intelligent than non-participants. They concluded that economic activity, occupation, socio-economic status, religious affiliation, nationality and citizenship influence SMP. They also found intelligence, a higher level of education and better quantitative and language skills increased the probability of SMP.

In a very relevant recent study Lai (2019) tested Taiwanese 385 adults and found Neurotic individuals tended to have negative attitudes toward stock investment while the perceived behavioral control of individuals regarding stock investment is influenced by Agreeableness, Extroversion, Conscientiousness, and Openness. He noted: "The effects of extroversion, conscientiousness and openness to experience on subjective norm are significant and positive. Accordingly, the security practitioners could attempt to search for persons who are cheerful and extroverted, strong-willed and conscientious, or individuals who are open to new things and ideas, because these individuals may have more time, energy, or money for participating in stock investment" (p16)

In a very recent study Firth et al., (2023) investigated the effects of Big Five personality traits and IQ on individuals' stock trading portfolios. They found traits had a small but significant effect: Openness and Extraversion were associated with undesirable outcomes whereas Conscientiousness was positive. Higher IQ was associated with lower trading activity but not enhanced investment performance and with portfolio size held constant, financial literacy had little effect. They argued that other factors, such as customer age, portfolio size and portfolio risk, better explain outcomes. They concluded that traits do predict investment outcomes but their effects are complex, and impactful only when compounded over long timeframes. The literature on personality correlates of SMP is therefore mixed.

Personality at Work

In this study we used the HPTI which was constructed to predict workplace behaviour and had good psychometric properties. For instance, each of the six factors have alphas between .72 and .80, a good fit, convergent validity with the established NEO-PI-R, and predictive validity with management level (MacRae & Furnham, 2020).

The HPTI was developed to measure personality at work, and has some overlap with the Big Five (FFM) on three traits (Cuppello, 2023ab) and includes three additional traits, shown to be related to success in a variety of jobs (Teodorescu et al., 2017). The first is *Conscientiousness* characterised by self-discipline, organisation, educational and business success and ability to moderate one's own impulses (Barrick et al., 2001). The second is *Adjustment* (low Neuroticism) and is characterised by emotional resilience to stressors, positive affect, and mood stability and regulation. The third is *Curiosity* (Openness) which is characterised by an interest in new ideas, experiences and situations. It involves new ways of completing tasks, new ideas and ways of doing things, as well as an interest in colleagues with different opinions.

Three traits are not covered by the Big Five. *Ambiguity Acceptance* (Tolerance for Ambiguity) is associated with how people process and perceive unfamiliarity or incongruence (Furnham & Ribchester, 1995). Those who can tolerate ambiguity perform well in new or uncertain situations, adapt when objectives are unclear, and are able to learn in unpredictable times or environments. The fifth trait is *Competitiveness*, which is related to low Agreeableness. Competitiveness focuses on the adaptive elements of competitiveness that drive self-improvement, desire for individual and team success, and learning. The final trait *Courage, or Approach to Risk*, which is the ability to combat or mitigate negative or threat-based emotions and broaden the potential range of responses. Courage is exhibited as the willingness to confront difficult situations and solve problems in spite of adversity.

A number of papers have used the HPTI (Cuppello et al., 2022; Furnham & Treglown, 2018, 2019, Furnham & Impellizzeri, 2021; Treglown et al., 2020ab). The psychometric properties of the measure have been reported (MacRae & Furnham, 2020) of which the most relevant is the study by Teodorescu et al. (2017). Their results indicated HPTI personality traits relate to subjective and objective measures of success with Conscientiousness being the strongest predictor.

This Study

In this study we are interested in three sets of correlates of SMP: demography, wealth and personality. We simply asked people whether they did or did not invest in the stock-market. From our review of the above literature we predicted from the above studies that males more than females (H1); older more than younger (H2); graduate rather than non-graduate (H3); more rather than less wealthy people (H4) would invest in the stock market, and those with higher scores on

Ambiguity Acceptance (H5), Competitiveness (H6) and Curiosity (H7) would invest in the stock market.

Participants

In all, 1509 adult participants took part in the study: 845 stated they were female, 661 male (Coded 1=female; 2=male). Their mean age = 45.67, SD = 11.01). In all 68% were university graduates. Most were employed in a variety of skilled and professional jobs. Participants were recruited from English-speaking countries (UK 56%, North America 18%, South Africa 12%, and others 14%). All were employed and working in industries such as manufacturing, health and education, IT and Finance. 25% were non-managers. Most could therefore be considered middle class.

Materials

Do you invest in the stock-market? In answer to this question 50.2% said yes and 49.8% said no. Asked to rate their personal wealth on a 100 point scale (from comparatively very low to very high) the mean was 55.97 (SD 21.94)

High Potential Trait Indicator (HPTI) (MacRae & Furnham, 2014). The HPTI is a measure of personality traits, specifically within a workplace context. It is comprised of six factors, outlined in the table below. The inventory is 78 items in length. It has been used in a number of studies (Cuppello et al., 2023ab; Furnham & Treglown, 2018; Teodorescu et al., 2017).

Procedure

Participants were recruited from a pool of individuals who had completed a psychometric assessment provided by test publisher Thomas International for genuine occupational test use, and subsequently volunteered to take part in psychology research. Participants were incentivized to take part by being offered brief feedback on their results following the study. Participants were emailed to inform them of the study and provide them with a link to complete and they gave their informed consent to analyse and publish the anonymized data. The study was conducted on an online survey platform. The research was approved by the committee LSA/TI/2022. Finally, participants were debriefed, thanked for their time and provided feedback on their scores.

ANALYSIS

From an overall dataset of 1509 adult participants, there was usable data for the hypothesis variables of interest (Stocks and the HPTI variables) from 1202 participants. There was significant levels of missing data amongst the control variables, in particular the control variable self-reported wealth was missing on 39% of cases.

In line with good practice (Allison, 2010) we used multiple imputation techniques for missing data, which provide the best approach to using full information and avoiding biased estimates of parameters and standard errors in analysis. Using all variables in the analysis, the SPSS 25 multiple imputation procedure was used to impute missing values in the control variables. Presented tables are from the pooled analysis of ten separate imputed data sets where imputed missing values are imputed with a random element that models the error of imputation. Since the criterion variable (stock investment) was dichotomous, we used binary logistic regression.

We used the software G*power to calculate the sample size needed to achieve 95% a priori power using logistic regression to detect a small effect size in each of the personality variables (with significance test criterion (α : of $p < 0.05$), controlling for the other variables. That

is, for the given effect size, there is a probability of 5% (1-.95), or less, of wrongly accepting the null hypothesis at a significance level of .05. The required sample size calculated was 1097, lower than our achieved sample. Power calculations help determine whether a sample will be sufficient to test a hypothesis, given assumptions about the likely effect size of a tested relationship. In particular they can help judge whether failure to reject the null hypothesis of no relationship between two variables is an important finding, or, perhaps, due to an inadequate sample with insufficient power to detect a real effect in the population of interest. Whilst the need to use a multiple imputation approach can reduce power, the missing values problem related to a control variable. Thus, we saw no reason to adjust the power calculation, since the reduction in power related only to detecting the effect of a control variable.

RESULTS

Table 1 reports Pearson correlations, with means and standard deviations on the diagonal.

The means and correlations are calculated using multiple imputation and give pooled estimates from across the 10 imputations. The calculation of significance adjusts for the error of imputation.

Insert Table 1 here

As can be seen from the table the correlations with having invested in the stock market are positive and significant for being male, age, having a degree and self-reported wealth. In terms of Cohen's (1988) classification of correlation effect sizes, these all fall in the range between small and medium.

Turning to the personality variables, we see a positive and significant correlation of having invested in the stock market with Conscientiousness, Adjustment, Risk Approach, Ambiguity Acceptance and Competitiveness. The correlation with curiosity is small and non-significant.

Considering the binary logistic regression results. Parameters reported in Table 2 below predict the odds of having invested in the stock market. $\text{Exp}(B)$ can be interpreted as the multiplicative effect on the odds of having invested in the stock market of a one-unit change in the variable. Thus, for example, being male is estimated to increase the odds of having invested in the stock market by 91%, and an increase of one year in age is estimated to increase the odds by 3%.

Insert Table 2 here

As in the correlation table we see the four control variables all having a positive and significant association with stock market investment. However, once other variables are controlled for, it is only Ambiguity Acceptance and Competitiveness among the HPTI personality variables that are significant predictors of stock market investment. To check this we ran the binary regression first with “control” variables of sex, age, education and self-perceived wealth and these factors accounted for 15% of the variance; when we added the six traits we could account for 18% of the variance suggesting that personality factors explained unique variance in stock market participation of 3%

Discussion

The results of this study confirmed a number of the hypotheses namely that males more than females, older more than younger, graduates more than non-graduates and people who rated their income higher were significantly more likely to be SMP. While five of the six personality traits were significantly correlated to SMP, the regression suggested only two were significant,

namely Tolerance for Ambiguity, and Competitiveness. Our personality measure uniquely measures these two factors beyond those assessed by the Big Five personality system.

MacRae and Furnham (2020) pointed out that trait Conscientiousness and Neuroticism have many times been shown to be correlated with general measures of work performance while the HPTI traits of Curiosity, Ambiguity Acceptance, and Courage may be required for specific job demands or other related behaviours.

It was no surprise that (subjectively assessed) more wealthy people invested in the SM, though it is not clear how much of their wealth was attributable to that activity. It may be the case that very wealthy people use asset/wealth managers to invest in the SM as they believe they have greater expertise, while others may be over-confident. Similarly, the results on SMP and sex, age and education both replicate previous findings.

Perhaps the most interesting finding is that from the personality measures. The correlational results suggest all six factors, except Curiosity (Openness) are positively associated with SMP. We thought that Curiosity would predict SMP as understanding the complex and changing financial world should appeal to the curious. The binary logistic regression results suggested that only two traits were important. The first was Ambiguity Acceptance which has been shown to be related to a wide number of positive work-related behaviours (Cuppello et al., 2022; Furnham & Impellizzeri, 2021; Teodorescu et al., 2017). Clearly SMP involves a great deal of uncertainty and ambiguity which should put off people who have difficulty with ambiguity and uncertainty. This insight is potentially important for financial advisors seeking to help investors (Lia, 2019).

Similarly, Competitiveness was logically related to SMP. Competitiveness focuses on the drive self-improvement, desire for individual and team success. Clearly success at SMP could satisfy any competitive need. Interestingly trait competitiveness is also seen as low Agreeableness which confirms the work of Bucciol and Zarri (2017). Competitiveness is linked to Ambitiousness and it seems clear that SMP provides an opportunity to engage in an activity which provided regular and clear feedback on performance which may be used to compare to others (Furnham et al., 2023).

It is interesting to note what while Risk Approach was a significant correlation of SMP it did not reach significance in the regression. Appetite for Risk has always been seen by economists and financial advisers as *a*, if not *the*, most important individual difference variables relating to personal financial affairs. The results of this study suggest that the variance in Risk Approach may have been more clearly accounted for in Ambiguity Tolerance, which is a unique finding well worth exploring.

Whilst correlations between Conscientiousness and Adjustment were in the predicted direction it is not surprising that they were not significant in the regression. Conscientiousness is all about planning and hard work which may be associated to professional SMP, but for many people could be too associated with luck and chance, and arenas where the trait has little impact. Similarly, the strong emotions associated with success and failure in SMP would suggest that those low on Adjustment (high on Neuroticism) would tend not to be SM investors for either amusement or serious investments. These speculations need investigation.

This study moves the literature forward in several ways. First, it highlights the literature on Ambiguity Tolerance and there is emerging neuroscience evidence that risk and uncertainty/ambiguity are processed by different areas of the brain (Morriss, 2023). Second, it

confirms data from the few other studies in the area of personality and SMP. Third, it re-asserts the importance of demography (sex, age, education) as the major determinants of SMP.

Like all others this study had limitations. We had no data on how long people had participated in stock market activities, how much time it consumed and how much money was involved, as well as their self-rated (and actual) success. It would be equally interesting to know *why* some chose and others avoided SMP, and their alternatives to how they invested or saved their money. Equally there may be potentially differences between the *occasional 'punter'* investor, the *savvy* individual investing their pension pot, and the more *professional* investor who is highly educated about the stock markets (e.g. the details of technical and fundamental analysis). Next, while we had a reasonable sample of adults they were inevitably skewed to towards those who were better educated, middle class professionals. Also, SMP varies across countries and it would be interesting to replicate this study across countries with different GDPs. Finally, as with all studies of this kind there is the problem of impression management and social desirability but because of the nature of this particular sample we believe the effect was minimal.

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Table 1*Pearson Correlations^{a,b} and Descriptives*

	1	2	3	4	5	6	7	8	9	10	11
1. Stocks (has invested)	.50 (.50)										
2. Sex (male)	.16**	.45(.50)									
3. Age (years)	.16**	.03	45.91 (10.91)								
4. Degree (yes)	.15**	-.07*	-.08**	.67 (.47)							
5. Wealth	.24**	.04	.07*	.17**	55.97 (21.31)						
6. Conscientiousness	.10**	-.05	.14**	.05	.21**	70.80 (8.96)					
7. Adjustment	.10**	.06*	.20**	-.02	.22**	.24**	64.06 (12.12)				
8. Curiosity	.03	.05	.01	.09**	.06	.33**	.18**	68.06 (8.81)			
9. Risk Approach	.12**	.16**	.17**	.00	.23**	.53**	.47**	.49**	64.42 (10.16)		
10. Ambiguity Accept	.16**	.04	.23**	.08**	.16**	.23**	.43**	.33**	.47**	52.05 (10.04)	
11. Competitiveness	.14**	.18**	-.16**	0.04	.13**	.33**	-.04	.06*	.27**	.07*	48.89 (12.37)

** . Correlation is significant at the 0.01 level (2-tailed). * . Correlation is significant at the 0.05 level

a. Means and (Std. deviations) on the diagonal.

b. Correlations and means are pooled estimates. Std. Deviations are from original data as not calculable for pooled imputations. N=1202

Table 2*Binary Logistic Regression Predicting Odds of Stock Market Investment*

	Model 1				Model 2			
	<i>B</i>	<i>S.E.</i>	Prob.	Odds Ratio	<i>B</i>	<i>S.E.</i>	Prob.	Odds Ratio
Sex (male)	0.70	0.13	0.000	2.01	0.65	0.13	0.000	1.91
Age (years)	0.03	0.01	0.000	1.03	0.03	0.01	0.000	1.03
Degree (yes)	0.65	0.14	0.000	1.92	0.63	0.14	0.000	1.87
Wealth	0.02	0.00	0.000	1.02	0.02	0.00	0.000	1.02
Conscientiousness					0.00	0.01	0.60	1.00
Adjustment					0.00	0.01	0.60	1.00
Curiosity					-0.01	0.01	0.47	0.99
Risk Approach					-0.01	0.01	0.19	0.99
Ambiguity Accept					0.02	0.01	0.01	1.02
Competitiveness					0.02	0.01	0.000	1.02
Constant	-3.43	0.36	0.000	.032	-4.78	0.72	0.000	0.01
Nagelkerke pseudo- R ²				.15				.18

N=1202. Parameters are the mean of parameters from analyses of 10 separate imputed data sets.

S.E. represents standard error. Standard errors and significance are adjusted for error of imputation.