OVERCONFIDENCE IN FINANCE WITH DIFFERENT DOMAINS: AN INTERDISCIPLINARY EXPERIMENTAL APPROACH*

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Abstract

Since, overconfidence cognitive bias is a hot topic in finance; it is examined both in empirical setting and experimental setting. The disadvantage of studies using secondary data is that overconfidence cannot be observed in real markets. Hence, studies using secondary data have to use some proxies for overconfidence, which can be misleading. However, it is possible directly detect overconfidence in experimental setting, since it is possible to control over other variables in experimental setting. The purpose of this study is to search for the overconfidence bias of UK subjects and investigate whether overconfidence is domain specific. Results indicate that people are generally overconfident. Most of them see themselves above average and overestimate precision of their knowledge. In addition, majority of them think that they are superior in trading in stock markets. It is found that overconfidence is domain specific. In particular, subjects are less confident in the domain of finance.

Keywords: Behavioral Finance, Experimental Finance and Overconfidence

Farklı Kategorilerde Finansal Aşırı Öz Güven Algısı: Disiplinler Arası Deneysel Bir Yaklaşım

Özet

Son yıllarda finans alanında ilgi gören aşırı öz güven algı sapmasının hem amprik hem de deneysel yaklaşımlarla incelendiği görülmektedir. İkincil veri kullanan ampirik çalışmaların dezavantajı ise aşırı öz güven algı sapmasının piyasalarda doğrudan gözlemlenemiyor olmasıdır. Bu nedenle, amprik çalışmalarda aşırı öz güven algı sapmasını temsil edeceği düşünülen çeşitli değişkenler kullanımakta ancak bu durum yanıltıcı sonuçlar ortaya çıkarabilmektedir. Bu kapsamda, deneysel çalışmaların değişkenlerin kontrol altına alınabildiği laboratuvar ortamında yapılıyor olması nedeniyle, aşırı öz güven algı

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sapması doğrudan ortaya konulabilmektedir. Bu çalışmanın amacı İngiltere'deki bireylerin genel ve finansal güven düzeylerini ölçümlemek ve aşırı özgüven sapmasının farklı alanlara bağımlı değişen bir yapısı olup olmadığını belirmektir. Elde edilen bulgular bireylerin genellikle sahip oldukları bilgilere aşırı güven duyduklarını göstermiştir. Çoğu birey kendini diğer katılımcılardan bilgi ve beceri olarak üstün görmekte ve hisse senedi piyaslarında üstün başarı elde edeceklerini düşünmektedirler. Ayrıca elde edilen bulgular bireylerin yatırım bilgisi gerektiren konularda kendilerine daha az güvendiğini ortaya koymaktadır.

AnahtarKelimeler: Davranışsal Finans, Deneysel Finans ve Aşırı Özgüven Algı Sapması

INTRODUCTION

Traditional finance base on the assumptions that individuals are rational, risk averse and have the required capabilities to understand and analyze the probabilities. Hence, a "rational expectations market" is indeed an efficient market since all available information is included in prices (Akintoye, 2008: 8). Traditional finance has difficulties in explaining some of facts observed in markets which are called as anomalies. Some of these anomalies are the market-to-book effect (Basu, 1977), Days of the Week effect (French, 1980), January Effect (Keim, 1983), Momentum effect (Jegadeesh and Titman, 1993), post-earnings announcement drift (Bernard and Thomas, 1989), closed-end fund anomaly (Lee et al., 1991), first-day IPO returns (Ritter, 1991), disposition effect (Shefrin and Statman, 1985), excess stock price fluctuations (Barberis et al., 2001), long run reversals (DeBondt and Thaler, 1985) and size effect (Banz, 1981). Even most staunch defenders of traditional finance accepted the insufficiencies of traditional finance in explaining some of these anomalies (Fama and French, 2008).

Since these evidences support the idea that models in traditional finance are insufficient to explain the anomalies observed in markets, a new area of study combining psychology with finance called as "Behavioral Finance" gained importance in the last few decades. In contrast to traditional finance, behavioral finance argues that financial decision making is prone to cognitive biases. One of the main issues related to individual biases is the so called overconfidence phenomenon. Overconfidence is the interdisciplinary study area of Psychology and Finance. Overconfidence is stated to be one of the robust behavioral biases in decision making process (Odean, 1998). In Psychology, overconfidence is generally related to the excessive certainty regarding the information individuals have. In particular, it is generally found that individuals think that they have more accurate information than actually they have (Allen and Evans, 2005: 108). It is also found individuals have excess certainty about precision of their knowledge.

Moreover, it is seen that people see themselves better than others although they are not (Urbig et al., 2009: 3).

The use of experiments in detecting these behavioral biases and their effects on decision making process can provide valuable findings in behavioral finance since experiments are conducted in controlled laboratory settings. It is argued that studies with secondary data face problems in testing the hypotheses in that many supplemental assumptions should be included (Bossaerts, 2000: 3).However, it is possible to eliminate these assumptions in controlled laboratory settings. In experimental studies it is possible to come up precise definitions of the relationships among factors. Though the use of experimental studies in finance is very common in literature there are very limited studies in this area in our country.

The aim of this study is to search for overconfidence in experimental asset markets. We think that subjects are generally overconfident in their decision making and see themselves better than average. The remainder of this study proceeds as follows. Section II reviews literature about overconfidence. Section III explains the data and sampling and describes the methodology. Section IV presents the results of the analysis. Finally, section V concludes.

I. LITERATURE REVIEW

Confidence is accepted to be some kind of an intellectual action and can be expressed qualitatively or quantitatively (Zakay and Tsal, 1993). Degree of confidence can vary from a negative value to a positive value which is overconfidence. Overconfidence is an interdisciplinary study area of Psychology and Finance which is accepted as quite a robust cognitive bias (Allen and Evans, 2005) and is seen as one of the hot topics examined in economics and finance (Skala, 2008: 34). Traditional view assumes that individuals are homo-economicus in particular individuals are rational. However, it is seen in reality that individuals are at least irrational. Literature has shown that most people are overconfident about their abilities, precision of their knowledge and see themselves better than others (Fischhoff et al., 1977; Taylor and Brown, 1988; Alicke et al., 1995; Bar-Tal et al., 2001; Moore and Healy, 2008; Urbig et al., 2009; Hilton et al., 2011; Abreu and Mendes, 2012).

Though overconfidence is studied both in empirical and experimental studies. Experimental studies have lots of advantages in detecting and examining the overconfidence. First of all, overconfidence cannot be directly observable in real markets. In this manner, disadvantage of empirical studies using secondary data in examining the overconfidence is that they have to use proxies for overconfidence. It is argued in literature that it creates a challenge of separating the effects of overconfidence with the possibility that the model is misspecified (Hirota and Sunder, 2006: 2). However, the superiority of experimental studies is that

under controlled laboratory settings overconfidence can be detected precisely since it a lot easier to examine cause and effect relation in controlled laboratory settings.

Many experimental studies showed that overconfidence behavior exist in decision making process (Alicke, et al., 1995; Camerer and Lovallo, 1999). It is shown in literature that overconfidence exist for drivers (Svenson, 1981), physicians (Christensen et al., 1981), clinical pediatrics (Singhal, 2001), game players (Johnson et al., 2006: 2513), students (Clayson, 2005), NASA (National Aeronautics and Space Administration) employees (Greenberg, 1986) and managers (Russo and Schoemaker, 1992). It is widely accepted in literature that there are three different forms of overconfidence. The first measurement is the entry level comparison of Camerer and Lovallo (1999) the second is the calibration based measurement (miscalibration) and the last one is the better than average effect. In this first approach, Camerer and Lovallo (1999) found that overconfident subjects enter the market more often when knowledge is essential. In the second miscalibration approach, it is seen that people generally fall in to the bias that they are better than their average (Taylor and Brown, 1988; Alicke et al., 1995; Abreu and Mendes, 2012). Skala (2008: 38) argued that humans generally have unreasonably favorable sight about themselves.

II. DATA AND METHODOLOGY

Overconfidence is examined in experimental setting which is programmed and conducted with the software z-Tree (Fischbacher, 2007). Experiment is conducted in the laboratories of University of York. 56 subjects participated the experiment in total. In this study, three different measurement of overconfidence is used. The first methodology is adopted from the study of Camerer and Lovallo (1999). This measurement base on a market entry game. In this measurement, subjects either decide to enter the market or stay out of the market. The capacity of the market is 2 and there are 4 subjects in of the markets. At the beginning of the each market case, subjects are assigned randomly to one of the groups of 4 subjects. Hence, for each market case each subject play with different subjects. In this market entry game, there is penalty for excess entry for each market case. The experiment consist of three phases. Each phase consist of 8 rounds, 24 rounds in total. In the first phase, subjects are ranked randomly by the program if they decide to enter the market. In the second phase, they are asked 6 general knowledge questions (2 hard, 2 moderate and 2 easy questions). The difficulty of the questions varies randomly across rounds. If subjects decide enter the market in this second phase, they are given 6 general knowledge questions. In the third phase, different from the second phase they are given 6 investment related questions (2 hard, 2 moderate and 2 easy questions). For this second and third phase, the rank of each subject hence their payoff depends on the number of correct answers compared to the number of correct answers of their rivals. Hence, the higher the number of

your correct answers is relative to others, the higher their payoff is. The payoffs are given in Table 1 below.

Table 1: Payoffs According Ranks

Ranking in the Group	Payoffs (Capacity = 2 people)
1	15
2	10
3	3
4	3

This methodology is widely used in literature and called as "Hard-easy effect". After answering the questions subjects are asked their estimate about the number of their correct answers and their confidence level regarding their estimate. Using these values, their miscalibration scores which are Confidence in Ability and Confidence about Precision are calculated as follows;

$$CIA = 1/N \sum_{t}^{T} (r - a) \quad (1)$$

$$CAP = 1/N \sum_{t}^{T} (r * c) - (a * l) \quad (2)$$

Where N is the total number of periods that the measures are calculated, t and T values are the first and last period. r is the estimate of the participants about the number of their correct answers, a is the number of real correct answers, l is the five-level Likert confidence measure, and c is the stated confidence levels. Confidence measures are estimated in two different domains, namely, in the domain of finance. Hence, confidence in the in ability in the domain of general knowledge (CIA_{p2}), confidence about precision of the knowledge in the domain of general knowledge (CAP_{p2}), Hence, confidence in the in ability in the domain of finance (CIA_{p3}), confidence about precision of the knowledge in the domain of finance (CAP_{p3}) is calculated for each subject in each market case. In measuring the better than average effect, we ask participants "Of the 56 people participating the experiment, how many of them do you think is going to more

successful than you in terms of general knowledge trivia questions/investment questions?". This score is only asked at the beginning of the experiment and referred as (BTA_g) for general knowledge questions, (BTA_f) for investment based questions. Hence, better than average measure for each subject is calculated as in the equation 3.

$$BTA_i = \frac{1+56}{2} - n \tag{3}$$

where i reefers to either general (g) or financial (f), n is the stated number. Moreover, they are asked "What is the probability that your payoff, will be top %10 in this experiment?". This measure is refereed as BTA_p and calculated using the equation 4.

$$BTA_p = p - \%10 \tag{4}$$

where p reefers to stated percentage (%). Finally, entry levels in these three different phases (E_1, E_2, E_3) are compared in order to test the hypothesis that the ones who enter the market more frequently when knowledge is essential are the ones who are more overconfident. Domain differences are also searched for better than average and miscalibration measures.

III. RESULTS

It is proper to start with the demographic in this experimental study. Results indicate that off the 56 subjects almost 54% of them are female. More than half of them (62.5%) are aged in between 16-25, 33.93% are in between 25 to 35, whereas only 4% are over 35. More than half of them (54.29%) have taken at least one finance courses in their education. We may infer that subjects are interested in finance. Moreover, almost half of the subjects have invested either in a stock/mutual fund or both of them in their lives. In particular, 17.86% invested in stocks, 14.29% invested in mutual funds and 14.29% invested in both of these financial instruments. An interesting result for the demographic analyses is that 93.33% of the subjects who have not invested in either stocks or mutual funds are willing to trade in the future. This result is quite important in that though almost half of the subjects are real traders, the results show that the majority none traders

are also potential real traders. Table 2 gives the descriptive statistics for all of the subjects. It is seen in Table 2 that subjects generally see themselves above average in the domain of general knowledge but not in the finance domain. In addition, in general subjects are at least not overconfident about precision of their knowledge in either of the domains. It seems that on average they are even underconfident about precision of their knowledge in finance domain. It is possible see the domain differences in Table 2.

Table 2: Descriptive Statistics for all of the Subjects

	Min	**Max**	**Mean**	**Std Dv.**	**P-value**
E_1	0.13	1.00	0.74	0.18	N/A
E_2	0.25	1.00	0.69	0.23	N/A
E_3	0.25	1.00	0.56	0.21	N/A
BTA_g	-19.50	28.50	8.09	10.08	0.000
BTA_f	-24.50	28.50	2.95	13.85	0.161
BTA_p	-10.00	90.00	25.71	33.66	0.000
CIA_{p2}	-1.50	2.25	0.45	0.86	0.000
CIA_{p3}	-2.00	1.33	-0.05	0.97	0.694
CAP_{p2}	-16.67	8.50	-2.00	5.81	0.013
CAP_{p3}	-22.00	2.86	-4.99	6.15	0.000

As expected, it is seen that that subjects generally enter the market less frequently when they are asked investment related questions. However, contrary to the results of Camerer and Lovallo (1999), in our experiment subjects do not decide to enter the market more frequently when they are asked general knowledge questions. Table 3 shows the domain differences across the overconfidence measures. In this respect, with this entry level measurement, we cannot conclude that subjects are on average overconfident in the domain of general knowledge. However, it seems that subjects enter the market less frequently when financial knowledge is essential. In other words, entry level measure indicates that subjects

are less confident in the domain of finance. Beside entry level measurement, overconfidence in terms of ability (CIA) and precision of the knowledge measures (CAP) also indicate domain differences. Similarly, results in Table 3 indicate that in general, subjects are less confident in financial domain both in terms of their abilities and precision of their knowledge. In addition, we see the domain differences in better than average measure. Similarly, subjects do not see themselves better than average in the domain of finance.

Table 3: Wilcoxon Signed and Rank Test for Domain Differences

	Mean Ranks			
	Negative	**Positive**	**Z-stat.**	**P-value**
$E_2 - E_1$	31.15	22.69	-1.119[b]	0.263
$E_3 - E_1$	29.69	16.59	-3.609[b]	0.000
$E_3 - E_2$	22.63	20.67	-5.222[b]	0.000
$CIA_{p3} - CIA_{p2}$	28.12	17.00	-5.955[b]	0.000
$CAP_{p3} - CAP_{p2}$	29.57	9.67	-6.273[b]	0.000
$BTA_f - BTA_g$	21.78	20.60	-3.104[b]	0.002

*b: based on negative ranks, c: based on positive ranks.

Figure 1 plots the self-rankings versus actual rankings of the individuals in terms of their general knowledge who answered the questionnaire. Figure 1 indicates that there is no significant correlation between the actual rankings of the subjects in terms of their general knowledge levels ($p = 0.566$). Hence, we are able to confirm prior researches indicating no significant correlation between self-rankings objective measures (see Larrick et al., 2007).

Figure 1: Self-Rankings versus Actual Rakings of Subjects in terms of General Knowledge

Figure 2: Self-Rankings versus Actual Rakings of Subjects in terms of Financial Knowledge

Figure 2 and Figure 3 plot the self-rankings versus actual rankings of the subjects in terms of their financial knowledge and payoffs. Figure 2 and Figure 3 indicate that there is no significant correlation between financial knowledge and payoff of the subjects.

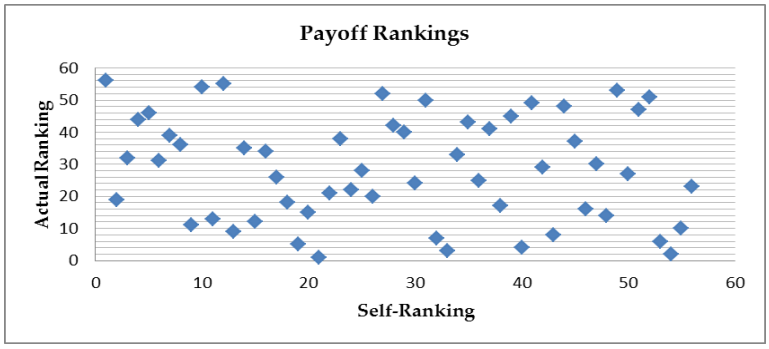

Figure 3: Self-Rankings versus Actual Rakings of Individuals in terms of Payoffs

Confidence differences is examined in Table 4. We couldn't find any gender differences among overconfidence measures, a finding which is in line with Kaustia and Perttula (2012). Contrary to the findings of many studies (Lenney, 1977; Deaves et al., 2009; Bhandari and Deaves, 2006; Biais et al., 2005) we find that women are more overconfident in the domain of general knowledge using the entry level measure of overconfident.

Table 4: Wilcoxon Signed and Rank Test for Gender Differences for Overconfidence Measures

	Mean Ranks			
	Negative	**Positive**	**Z-stat.**	**P-value**
$CIA_{p2}(M) - CIA_{p2}(F)$	15.46	10.73	-0.619[b]	0.536
$CIA_{p3}(M) - CAP_{p3}(F)$	13.64	10.90	-1.172[b]	0.241
$CAP_{p2}(M) - CAP_{p2}(F)$	15.39	11.29	-1.016[b]	0.310
$CAP_{p3}(M) - CAP_{p3}(F)$	17.08	9.92	-1.181[b]	0.238
$BTA_g(M) - BTA_g(F)$	12.72	8.68	-0.356[b]	0.722
$BTA_f(M) - BTA_f(F)$	15.59	10.96	-0.243[b]	0.808
$BTA_p(M) - BTA_p(F)$	13.00	10.00	-0.538[b]	0.591
$E_1(M) - E_1(F)$	9.00	10.46	-1.662[b]	0.097
$E_2(M) - E_2(F)$	12.94	11.43	-2.009[c]	0.045[*]
$E_3(M) - E_3(F)$	11.32	10.36	-1.500[c]	0.134

*b: based on negative ranks, c: based on positive ranks.

We also searched whether familiarity with financial concepts have an effect on the degree of overconfidence. It is seen in Table 4 that the subjects who have taken any finance courses do not differ from their peers.

Table 5: The Effect of Familiarity with Financial Concepts

	Mean Rank			
	Negative	**Positive**	**Z-stat.**	**P-value**
$E_1(Fin.Fam.) - E_1$	9.35	9.69	-0.352[b]	0.725
$E_2(Fin.Fam.) - E_2$	7.46	13.58	-0.584[b]	0.861
$E_3(Fin.Fam.) - E_3$	8.00	10.13	-0.846[b]	0.831
$BTA_g(Fin.Fam.) - BTA_g$	8.85	11.20	-1.288[b]	0.198
$BTA_f(Fin.Fam.) - BTA_f$	9.13	11.50	-0.584[b]	0.559
$BTA_p(Fin.Fam.) - BTA_p$	10.55	9.25	-0.846[b]	0.398
$CIA_2(Fin.Fam.) - CIA_2$	9.17	12.50	-0.187[b]	0.852
$CIA_3(Fin.Fam.) - CIA_3$	9.54	11.94	-0.355[b]	0.723
$CAP_2(Fin.Fam.) - CAP_2$	9.67	11.75	-0.411[b]	0.681
$CAP_3(Fin.Fam.) - CAP_3$	10.83	10.00	-0.933[b]	0.351

*Asm. Sig. 2 tailed, **b: based on negative ranks, c: based on positive ranks.

In particular, familiarity with financial concepts does not have an effect on the degree of overconfidence in both general knowledge and financial knowledge domain. Moreover, these subjects do not enter the market more often when financial knowledge is essential. We also examined the effects of investment experience on the degree of overconfidence. The results are shown in Table 5.

Table 5: The Effect of Investment Experience

	Mean Rank			
	Negative	**Positive**	**Z-stat.**	**P-value**
$E_1(Inv.EXp.) - E_1$	10.77	11.25	-0.105[c]	0.916
$E_2(Inv.EXp.) - E_2$	9.96	13.72	-0.098[c]	0.922
$E_3(Inv.EXp.) - E_3$	8.28	10.72	-0.481[b]	0.630
$BTA_g(Inv.EXp.) - BTA_g$	10.32	11.75	-0.070[b]	0.944
$BTA_f(Inv.EXp.) - BTA_f$	11.25	10.00	-0.562[b]	0.574
$BTA_p(Inv.EXp.) - BTA_p$	11.50	10.45	-0.383[c]	0.702
$CIA_2(Inv.EXp.) - CIA_2$	11.42	12.64	-0.030[b]	0.976
$CIA_3(Inv.EXp.) - CIA_3$	10.13	12.17	-0.209[c]	0.835
$CAP_2(Inv.EXp.) - CAP_2$	11.09	12.83	-0.487[b]	0.627
$CAP_3(Inv.EXp.) - CAP_3$	11.92	12.09	-0.152[c]	0.879

*Asm. Sig. 2 tailed, **b: based on negative ranks, c: based on positive ranks.

It is seen in Table 5 that the subjects who have experience in investment do not differ from their peers. In particular, investment experience is not a significant factor of the level of confidence on either of the domains. Moreover, entry levels of these subjects do not differ from each other.

CONCLUSION

Since, overconfidence cognitive bias is a hot topic in finance; it is examined both in empirical setting and experimental setting. The disadvantage of studies using secondary data is that overconfidence cannot be observed in real market. Hence, studies using secondary data have top use some proxies for overconfidence. However, it is possible directly detect overconfidence in experimental setting. In particular, it is possible to control over other variables in experimental setting. In this study, we examine the overconfidence bias of UK subjects, in controlled laboratory settings.

As expected, it is seen that subjects are generally overconfident about their abilities and precision of their knowledge in general knowledge domain. Moreover, it is found that many subjects see themselves above average in the domain of general knowledge. However, we find domain differences across general and financial knowledge in this study. In particular, subjects are less confident in the finance domain. In essence, majority of them are under confident in the domain of finance. A plausible explanation might be the effect of investment experience. Since many subjects do not have investment experience, it might be an expected result that they are underconfident about investment abilities. However, our results indicate that the subjects who have investment experience do not differ from the ones who are inexperienced. This indicates that underconfidence is not driven by investment experience. Hence, it is concluded that our subjects are indeed generally underconfident in the domain of finance. In this respect, subjects are less confident in the domain of finance both in terms of their abilities and precision of their knowledge. Moreover, contrary to the case in the domain of general knowledge, they do not see themselves above average the domain of finance. In addition, we couldn't find any gender differences among overconfidence measures, a finding which is in line with Kaustia and Perttula (2012). However, contrary to the findings of many studies (Lenney, 1977; Deaves et al., 2009; Bhandari and Deaves, 2006; Biais et al., 2005) we find that women are more overconfident in the domain of general knowledge using the entry level measure of overconfident.

We think this study might be helpful to investors and intermediaries in reducing overconfidence behavior in markets. However, as it is in the case of almost every experimental study, this study has some limitations. First of all, it may not be generalizable to the real world. Moreover, risk attitude of the subjects should be taken into account in future studies.

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