3rd GLOBAL CONFERENCE on BUSINESS, ECONOMICS, MANAGEMENT and TOURISM, 26-28 October 2015, Roma, Italy

Driving Forces of Entrepreneurship; an Experimental Approach

Petr Obergruber[a*], Gabriela Hrubcova[a]

aUniversity of Economics, Departmant of Microeconomics, W. Churchill Sq. 1938/4, Prague, Czech republic

Abstract

The experimental approach in whole economical science, despite of rising popularity, is highly uninvestigated. The obvious benefits of this kind of view are often overlook or substitute with more abstract mathematical way, sacrificing precise data for more elegant but sometimes too simplistic model. Thus in this paper we examine a dataset from experiment we designed to investigate the entrepreneurship phenomenon and its driving forces. We used a framework for identify entrepreneurship potential of participants base on the five-factor personality system theory of Costa & McCrae (1992) known as Big-Five. We were able to develop the experimental design, which was able to measure the overconfidence of participants and afterwards model the relationship between all Big-Five dimensions and measured overconfidence.

1. Introduction

Optimism is normal human trait, but some people are more optimistic than others. If someone is genetically endowed with optimistic bias, there is no need to tell this person that he or she is happy – that is something he or she knows.

Optimism plays significant role in many parts of our live. As Mosing et al. (2010) showed, optimistic people are usually cheerful and happy which is why they are favored people in group. Snowdon (2001) researches also show, that there is significantly lower risk for clinical depression, they have stronger immunity system and in average they

---

* Petr Obergruber, Tel.: +420 728 138 996;
  E-mail address: xobep00@vse.cz

live longer. Moreover has been proven by Puri & Robinson (2007), optimistic people have higher chance to enter into another marriage after divorce.

Optimistic people are often those people "who are seen". This statement has been studied from many angles by many teams, for example Camerer & Lovallo (1999), Hmieleski & Baron (2009), Moore & Healy (Moore & Healy, 2007): They concluded that optimistic people tend to be more often leaders (both in organizations an in the army or the armed forces), managers, inventors, politicians and last but not least entrepreneurs.

On the other hand there are those areas, where we cannot identify human behavior or decision making as optimistic, because we are facing rational information which tells us how we are actually stands. In that case we should choose more appropriate identification – overconfidence.

Research results (see above) shows, that optimism plays significant (sometimes decisive) role when people are facing decision making process which include risk. By Cooper (Cooper, 1994), there is group of people who invest many time and resources in discover what are their chances are, on the other hand (where overconfidence plays role) there are group of people, who just assume they have those information and make decision. In that case, many people overlook some critical aspects in the environment just because they believe they are farseeing (which are not). But at the end, optimism could make things keep going, boost endurance and determination and rise chances to success after all.

There are areas where people habitually identify themselves as above average with only a weak dependence on a basic knowledge about the actual skill, ability or knowledge. Recent evidence from Moore & Healy (2007), however, has cast doubt on the generality of overconfidence. There are a number of different domains in which people are systematically underconfident. For example Kruger (Kruger, 1999) followed by Kruger & Burrus (2004) shows that, people believe that they are below average in unicycle riding, computer programming, and their chances of living past 100. It turns out in study of Moore & Kim (Moore & Kim, 2003), that people tend to predict that they will be better than others on easy tasks where absolute performance is high, but worse than others on difficult tasks where absolute performance is low. Also from studies mentioned above from Camerer & Lovallo (1999) and Kruger (Kruger, 1999) a number of researchers have explained this effect as egocentrism: People focus on their own performances and neglect consideration of others'.

Researches in those studies are often focused only on one part of our interest. On the one hand we have many researches interested in overconfidence and on the other hand there is research related to Big-five. Our main focus is to explore some possibilities to merge those interests and with experimental approach discover potentially related factors in entrepreneurship, overconfidence and Big-five personality treats.

2. Experimental research and hypothesis

Our experiment intended to predict overconfidence via a series of predictors founded to be potentially predictive of overconfidence.

As overconfidence is somehow related to entrepreneurship and business foundation and Big-five is related to entrepreneur`s personalities, we developed hypothesis:

All five dimensions of Big-five personality treats combined are predictors to overconfidence.

More specifically, high score at openness, conscientiousness and extraversion dimension will be predictors of overconfidence and low score at agreeableness and neuroticism will be predictors of overconfidence as well.

2.1. Independent variable, dependent variable and experimental design

The experiment as its own has been prepared for execution in Laboratory of experimental economics at Friedrich Schiller University in Jena with z-Tree software[†]. In average the experimental group last for 25 minutes while 4

————

[†] z-Tree is a widely used software package for developing and carrying out economic experiments. The language used to define the experiments is simple and compact, meaning that experiments can be developed quickly, and programming experience is not necessary, though useful. The program can be licensed free of charge. Here I would like to thank University of Zurich for developing and freeware use.

groups were executed in same time. Participant of experiment got simple instruction guide. Understatement has not been tested because there were no tricky parts in experiment – participants confirmed their understatement themselves – also there were no question in groups. Data were collected real-time.

The experiment consist from two parts. That reflecting independent variable (I.V.) and dependent variable (D.V.).

Independent variable (I.V.)

The independent variable in this experiment capture psychological profile by Big-five traits in order to identify potential entrepreneurs. This I.V. is based on Cantner, Goethner, & Silbereisen (2015) 45 question questioner which measure all five dimensions of Big-five profile (openness, conscientiousness, extraversion, agreeableness, neuroticism).
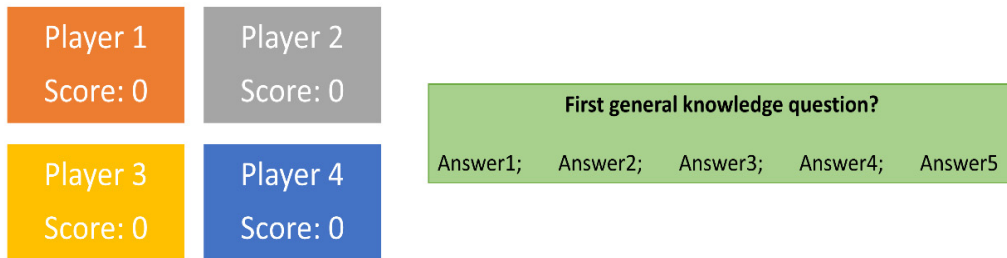
Dependent variable (D.V.)

Based on big-five personality treats the experiment is trying to predict the level of overconfidence (D.V.) – hypothesis says that Big-five has some predict power to predicting overconfidence.
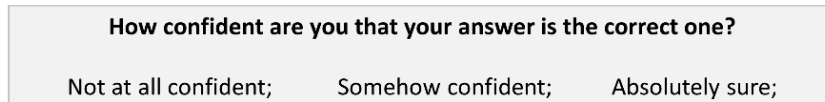
Overconfidence is measured by several general knowledge questions and follow-up question. The general knowledge approach is quite usual for example in Camerer & Lovallo (Camerer & Lovallo, 1999) so this experiment did not try to improve or replace this part. General knowledge part is consist from 10 question.

Table 1 - 10 general knowledge questions

#	Question
1.	What nationality was Chopin?
2.	Who lived at 221B Baker Street London?
3.	Where did Salvador Dali live?
4.	Who wrote Lazarillo de Tormes?
5.	Who was the director of the film Psycho?
6.	In Egyptian mythology a criosphinx is a figure that has the body of a lion and the head of a what?
7.	Which of these materials is used by Tibetan Buddhhists to construct circular diagrams called mandalas?
8.	What is the capital city of Paraguay?
9.	Approximately how long does it take for light from the sun to reach the Earth?
10.	Who wrote the 1865 book of poetry Drum-Taps while a war correspondent for the New York Times?

| Player 1 Score: 0 | Player 2 Score: 0 |
| Player 3 Score: 0 | Player 4 Score: 0 |

First general knowledge question?

Answer1;   Answer2;   Answer3;   Answer4;   Answer5

Picture 1 - The starting position of experiment (one group)

How confident are you that your answer is the correct one?

Not at all confident;   Somehow confident;   Absolutely sure;

Picture 2 - Follow-up question

The added part is the follow-up question which after every general knowledge question asks „*How confident are you that your answer is the correct one?* ". For simplicity there were just three possible levels of assurance – not at all, somewhat confident and very confident. The 10 question part has been repeated 5 times (for every participant) with same questions and same follow-ups.

The level of overconfidence has been measured in:

- Confident but wrong answers and
- Wrong but unchanged answers between rounds

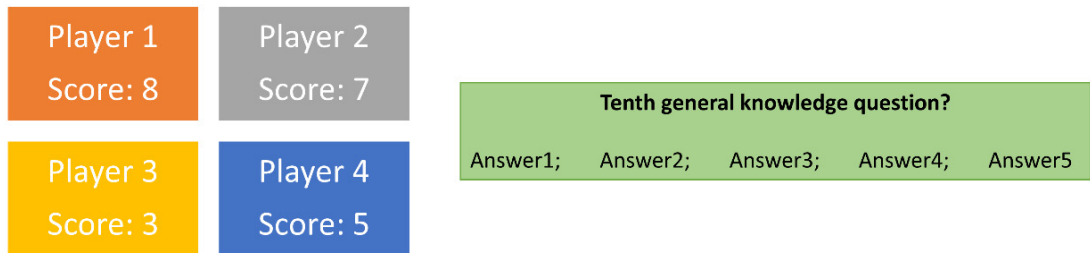From this the level of overconfidence is the sum of those numbers.

2.2. Feedback

The whole experiment divided participants to 4-members group. In all groups there were same questions. After every of 10 rounds every participants get one of two possible feedback regard of their performance:

- You had the best performance in the group
- You had **not** the best performance in the group

Whole experiment focused on behavior of participants after the *"You had **not** the best performance in the group"* feedback. Whole experiment supposed few patterns of behavior which at the end should show if there is some relationship between D.V. and I.V.

In this particular design there is one considerable concern. The participants with *"You had **not** the best performance in the group"* feedback could change only one or few answers primarily because strategical behavior. Their thinking would be - If I change too much and I still get the "You had not the best performance in the group" feedback, I cannot know which changes were right and which were wrong. In closer look it turns out that this

behavior is still driven by overconfidence (I change only those where I do not believe they could be right) so the experiment still stands.

| Player 1 Score: 8 | Player 2 Score: 7 |
| Player 3 Score: 3 | Player 4 Score: 5 |

Tenth general knowledge question?

Answer1;   Answer2;   Answer3;   Answer4;   Answer5

Picture 3 - The end of one round (one group)

How confident are you that your answer is the correct one?

Not at all confident;   Somehow confident;   Absolutely sure;

Picture 4 - Follow-up question (does not change in all cases)

After that player 1 gets *"You had the best performance in the group"* feedback and the others get *"You had **not** the best performance in the group"* feedback.

In case of tie, all players with the highest score gets *"You had the best performance in the group"* feedback.

2.3. Results of the experiment

First the experiment provides data about overall overconfidence. Whole factor of overconfidence has been measured in two dimensions which at the end has been combined. First dimension of overconfidence has been measured by wrong but confident answers. Picture 6 shows the level of confidence in number of wrong but confident answers (black points identify wrong but somewhat confident or very confident, red points shows only wrong but very confident answers). As we can see, every participant shows some level of confidence (although there were 6 participants which did not even once mark wrong answer as very confident), but there are significant differences, which signals other influences than the questioner itself. The upper limit is 50, which is number of all answered questions (5 rounds with 10 questions), lower limit is zero.

The second dimension of overconfidence has been measured in wrong but unchanged answers. Picture 5 shows the level of confidence in number of wrong but unchanged answers. As we can see di diversity on this dimension of overconfidence is quite high, which tells us again, that other aspects besides questioner plays a role.
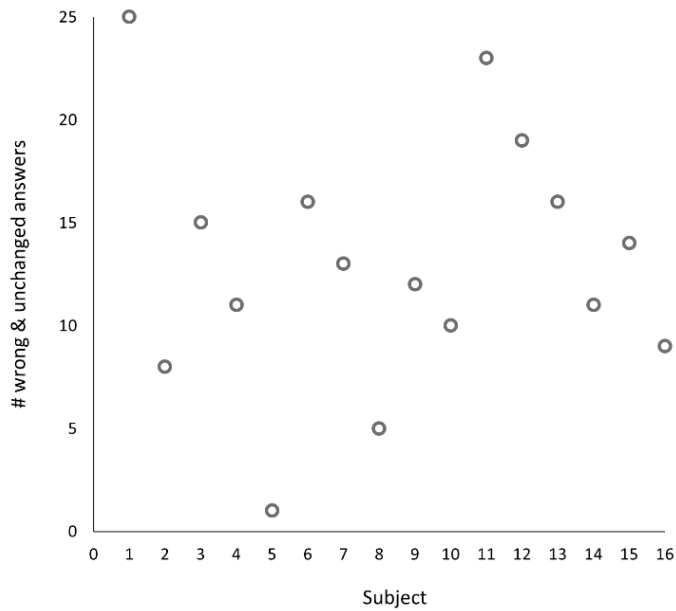
Picture 5 - Overconfidence - the wrong/unchanged answers dimension
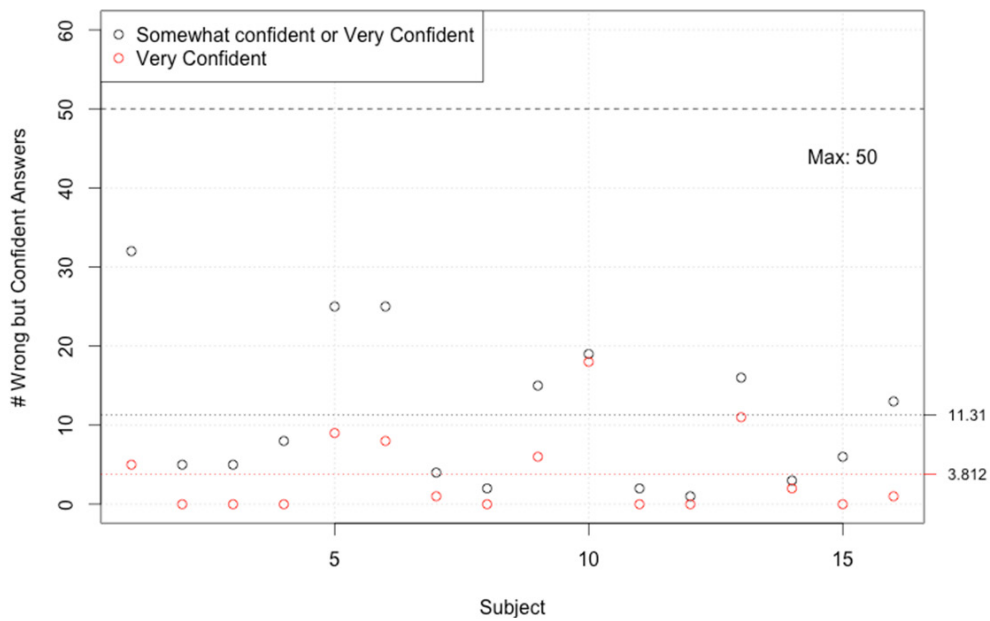
Picture 6 - Overconfidence - the wrong/confident answers dimension

For illustration the experiment took Big-five personality treats and with literature mainly Cantner et al. (2015) and Cantner, Silbereisen, & Wilfling, (2011) named strength of potentiality to be entrepreneur.

The perfect entrepreneur is person who:

- Score high at openness dimension,
- Score high at conscientiousness dimension,
- Score high at extraversion dimension,
- Score low at agreeableness dimension,
- Score low at neuroticism dimension,

In following text we named:

The *entrepreneur* if he/she scores at 4 dimensions as perfect entrepreneur and one dimension differently,
The *unskilled entrepreneur* if he/she scores at 3 dimensions as perfect entrepreneur and 2 dimension differently,
The *unlikely entrepreneur* if he/she scores at 2 dimensions perfect entrepreneur and 3 differently,
The *non-entrepreneur* if he/she score at 1 dimensions as perfect entrepreneur and 4 differently,
The *perfect non-entrepreneur* if he/she score at all 5 dimensions differently than the perfect entrepreneur.

The experiment identified only the middle 4 groups (entrepreneur, unskilled entrepreneur, unlikely entrepreneur, non-entrepreneur) in total of 16 participants (4, 5, 5, 3). Although the research sample was that small, the statistical analysis shows some statistically significant results.

For statistical analysis has been used simple linear modeling in R. The entrepreneur category has been taken as reference to other categories.

Call:
lm (formula = overconfidence – BIG5.O + BIG5.C + BIG5.E + BIG5.A + BIG5.N
Category, data - data)
Coefficients:

Table 2 - Linear modeling of I.V. and D.V. - results

	Estimate	std. Error	t value	Pr(>|t|)
(intercept)	181.1676	80.7365	2.244	0.0660 .
BIG5.0	-1.8709	1.3869	-1.349	0.2260
BIGS.C	2.1592	1.2875	1.677	0.1445
BIGS.E	-0.2181	0.9176	-0.238	0.8200
BIG5.A	-1.6598	0.9984	-1.662	0.1475
BIGS.N	-1.8345	1.0229	-1.793	0.1231
Category non-entrepreneurial	23.6332	13.S061	1.750	0.1307
Category unlikely entrepreneur	17.2585	8.4303	2.047	0.0866 .
Category unskilled entrepreneur	38.7419	13.8937	2.788	0.0316 *

signif. codes: 0 ´***´ 0.001 ´**´ 0.01 ´*´ 0.05 ´.´ 0.1 ´ ´ 1
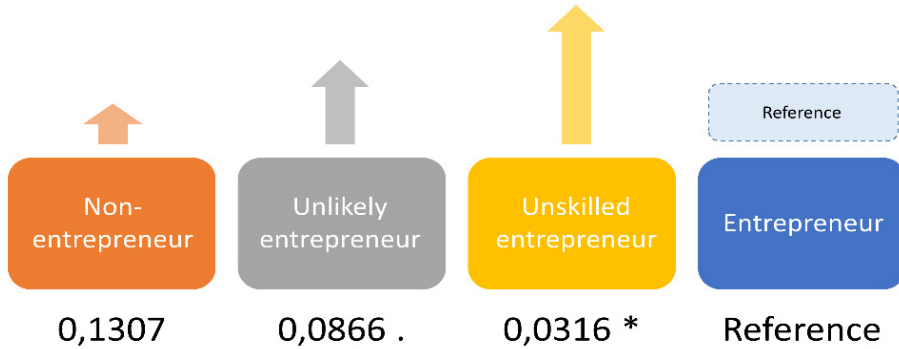
Picture 7 - Linear modeling of I.V. and D.V. - significance

In order of hypothesis prediction, we can identify the predictors from Big-five personality treats. Experiment has been designed to predict the overconfidence by:

- Score high at openness dimension,
- Score high at conscientiousness dimension,
- Score high at extraversion dimension,
- Score low at agreeableness dimension,
- Score low at neuroticism dimension,

which is *perfect entrepreneur* profile. As we can see conscientiousness dimension, agreeableness dimension and neuroticism dimension has same direction which relevant literature and experiment itself expected. Those 3 dimension of the D.V. could be predicting of the I.V. with some statistical significance (dependent on category of entrepreneur). Other two dimensions shows the other direction and in this case shows themselves as not predicting the D.V.
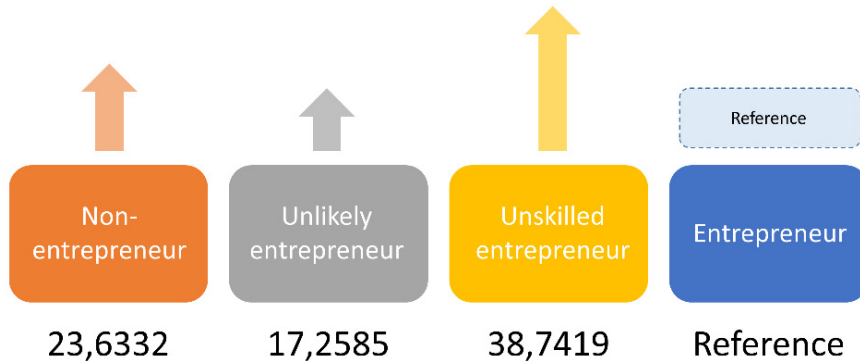
Picture 8 - Linear modeling of I. V. and D.V. - estimates

3. Conclusion and discussion

Empirical studies show a high rate of businesses failure. This paper explored some aspects of overconfidence and tried some relationship with entrepreneurship true Big-five personality treats. The results shows that there were significant amount wrong but unchanged answers but also the number highly fluctuated between participants. More

interestingly, there were quite high amount of somehow confident and very confident answers, which were wrong in the same time (in average more than 20% of all answers). This number highly fluctuated between participants. We were also interested in number of very confident and wrong answers (which is stronger condition than the one before). We found the average of 3.8 those answers. This number fluctuated less, but also there were strong condition at the first place for those answers, therefore the lower spread was expectable.

More interestingly in context of out hypothesis, we found some significant relationships between overconfidence and entrepreneurial personality. Moreover, with defined entrepreneurial personality, the significance of this relationship raised. In this case we can explain (predict) the level of overconfidence with three dimensions of Big-five: conscientiousness dimension, agreeableness dimension and neuroticism dimension. The other two (openness and extraversion) shown themselves as not to be predictors of overconfidence in this case. Is this statistical modeling with one reference level we discover those relationships significant with 0,05 degree of reliability in one case, than with 0,1 degree of reliability in one case as well and with degree of reliability higher than 0,1 also in one case. With hypothesis stands:

> *All five dimensions of Big-five personality treats combined are predictors to overconfidence.*

We have to reject hypothesis, because not all of the Big-five dimensions shown themselves as predictors of overconfidence. Moreover the significance is diminishing with declining category of entrepreneur and on unskilled entrepreneur level we cannot speak about statistically reliable result.

Acknowledgement

Bibliography

Camerer, C., & Lovallo, D. (1999). Overconfidence and Excess Entry: An Empirical Approach. *The American Economic Review*, *89*(1), 306–318. Dostupne z http://www.researchgate.net/publication/4980840_Overconfidence_and_Excess_Entry_An_Empirical_Approach

Cantner, U., Goethner, M., & Silbereisen, R. K. (2015). Schumpeter ' s Entrepreneur Psychological , Sociological and Economic Dimensions. *Friedrich Schiller University Jena, Department of Economics*, 1–38.

Cantner, U., Silbereisen, R. K., & Wilfling, S. (2011). Which Big-Five personality traits drive entrepreneurial failure in highly innovative industries? *Friedrich Schiller University Jena, Department of Economics*, (April), 1–36.

Cooper, C. L. (1994). Healthy Mind; Healthy Organization-- A Proactive Approach to Occupational Stress. *Human Relations*, *47*(4), 455–471. http://doi.org/10.1177/001872679404700405

Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences*, *13*(6), 653–665. http://doi.org/10.1016/0191-8869(92)90236-I

Hmieleski, K. M., & Baron, R. A. (2009). Entrepreneurs' Optimism And New Venture Performance: A Social Cognitive Perspective. *Academy of Management Journal*, *52*(3), 473–488. http://doi.org/10.5465/AMJ.2009.41330755

Kruger, J. (1999). Lake Wobegon be gone! The „below-average effect" and the egocentric nature of comparative ability judgments. *Journal of personality and social psychology*, *77*(2), 221–32. Dostupne z http://www.ncbi.nlm.nih.gov/pubmed/10474208

Kruger, J., & Burrus, J. (2004). Egocentrism and Focalism in Unrealistic Optimism (and Pessimism). *Journal of Experimental Social Psychology*, *40*, 332–340.

Moore, D. A., & Healy, P. J. (2007). The Trouble with Overconfidence. *Research Showcase @ CMU*, *5*, 0–75.

Moore, D. A., & Kim, T. G. (2003). Myopic social prediction and the solo comparison effect. *Journal of personality and social psychology*, *85*(6), 1121–35. http://doi.org/10.1037/0022-3514.85.6.1121

Mosing, M. A., Verweij, K. J. H., Medland, S. E., Painter, J., Gordon, S. D., Heath, A. C., … Martin, N. G. (2010). A genome-wide association study of self-rated health. *Twin research and human genetics : the official journal of the International Society for Twin Studies*, *13*(4), 398–403. http://doi.org/10.1375/twin.13.4.398

Puri, M., & Robinson, D. T. (2007). Optimism and Economic Choice. *Journal of Financial Economics*, 2–29. Dostupne z http://papers.ssrn.com/abstract=1010023

Snowdon, D. (2001). *Aging with Grace: What the Nun Study Teaches Us About Leading Longer, Healthier, and More Meaningful Lives* (Reprint ed). Cleveland: Bantam. http://doi.org/9780553380927