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## Education As Public Good: Behavioral Economics Approach

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### Abstract

Nowadays in developed countries education as a system often becomes public, society getting a lot of new information and knowledge based values. Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training, or research. Education is available for more people than in previous times; even it can be identified as mass education that can be evaluated as a public good. Behavioural economics study the effects of social, cognitive, and emotional factors on the economic decisions of individuals and institutions and the consequences for benefit and the resource allocation. Behavioral economics does not take the characteristics of the decision-maker as fixed, the focus is on the non-equilibrium processes, actions of diverse agents with bounded rationality who may learn from experience and interactions. The education and as result, high cumulative level of knowledge in society, might have an influence on complexity and difficulty on country's economic system, especially regarding behavior economics approach. The research object of this article is identifying correlation between mass education and complexity of rationality in financial economics. The research aims of this article to describe and evaluate different approaches of rationality in financial economics field regarding mass education. The results of research are to provide readers with understanding of behavioral economics approach regarding different level of education and financial literacy.

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### 1. Education and behavioral economics

Today's relationship between level of economic (more particular, financial) education and efficiency of real economy is one of the main topic in scientific debate in the field of many different approaches. It is practically impossible separate economics science from others disciplines, like psychology, human behavior, philosophy, ethic and etc. A common approach is that financial literacy is determined by knowledge; in various studies the population

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is categorized into literate or illiterate, according to whether they have saved money for hard times or have set long-term planning goals, or their taking care of the income and funds assigned for retirement. (Borodich, Deplazes, Kardash, and Kovzik, 2010). Also the population's investment in the stock market, awareness of their actions or proper distribution of investment is taken into account. For determining financial literacy, the following issues are taken into account: whether a person knows how to align daily income and expenses, whether he is not hopelessly indebted. With sufficient knowledge it is possible to further develop skills that could be useful for gaining financial benefit. Therefore, it is important to develop knowledge: first in mathematics, then in micro and macroeconomics, so that to realize how finances are managed, how they depend on the environment, also to learn the most essential things about money, interest, inflation, etc. (Evans and Honkapohja, 2001). Overall knowledge should promote rational behavior, proper choice of financial services and help to avoid errors that impair the person's financial situation. Globalization and recovery of financial markets and permanent changes in economics, which are difficult to predict, highlight the need for financial literacy (Barro, and Ursua, 2009; Roubini, Nouriel and Mihm, 2010) These changes and technological innovation is changing the financial behavior of individuals and personal financial management. With the development of economic science, the economists' approach to the consumer's financial behavior has changed (see figure 1 a). Two basic theories are distinguished: the efficient market hypothesis and financial behavior. In recent years, there is much debate on the efficient market hypothesis and the significance of financial behavior in economic theory.

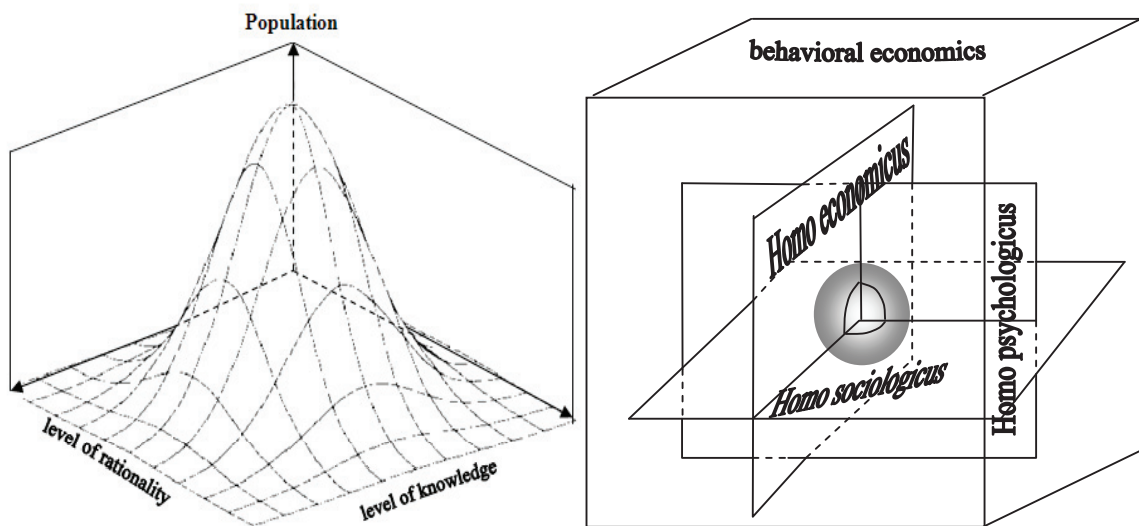


Fig. 1. (a) Gaussian 3D function regarding level of knowledge and rationality ; (b) behavioural economics approach

The emerging discrepancy between the efficient market hypothesis and reality encouraged a deeper insight focused on psychology, as an important factor in financial theory. Behavioral economics was formulated - a new branch of theory, combining the knowledge of psychology, sociology and other social sciences (see figure 1 b Buss,) (Buss, 2009). Due to the integration of various scientific knowledge behavioral economics better explains market anomalies and financial behavior of individuals. An efficient market theory hypothesis maintains that investors, while competing for big profits, establish fair prices. In order to better understand an individual financial behavior, the behavioral theory of psychology, sociology and anthropology is applied. An efficient market is associated with the theory of rational expectations, including the assessment of all information about property. However, if there are many irrational investors and their financial behavior does not correlate, and their transactions invalidate each other and have an impact on prices, the question arises on a far too poor assessment of the irrational investors' impact on the market. If investors are irrational, their financial decisions determine prices, although do not change the value of financial assets. As a result, rational investors can sell overvalued or buy undervalued assets, thus gaining profit, until the asset price converges with its value (Berg and Gigerenzer 2010).

Key issues related to modern behavioral economics involve the following: how to most effectively meet, in respect of the absence of objection, the interacting and competing economic agents' needs, how to implement such a division in practice, what methods are socially correct, which division method provides a major benefit. These and other questions need to be answered during the transition from the abstract theory of stable division to practical solutions of the institutional market design, and the content of a modern game theory is much wider. The applied analytical tools allow approaching the interaction between individuals from a different perspective, formulating general principles of optimality and extending the range of the survey instruments. On the other hand, practice provides an opportunity to get back to realistic implications of information asymmetry, peculiarities of individual behavioral characteristics and specific challenges of the market economy. Theoretical mathematics and empirical adequacy mutually make a kind of gambling that requires a compromise and a stable solution; this resulted in the development of a new research field and allowed to significantly improve the operational market efficiency, even in cases where the conventional market forces fail and are not able to regulate people's choices.

**2. Rationality analysis and asymmetrical information**

Economic theory assumes that every economic entity acts rationally. Producers, consumers, resource owners and other economic actors, in serving their own interests, seek to maximize benefits.

A traditional argument for this activity refers to the fact that the market is not able to cover all information related to specific economic areas (Easley, David and Jon Kleinberg 2010).

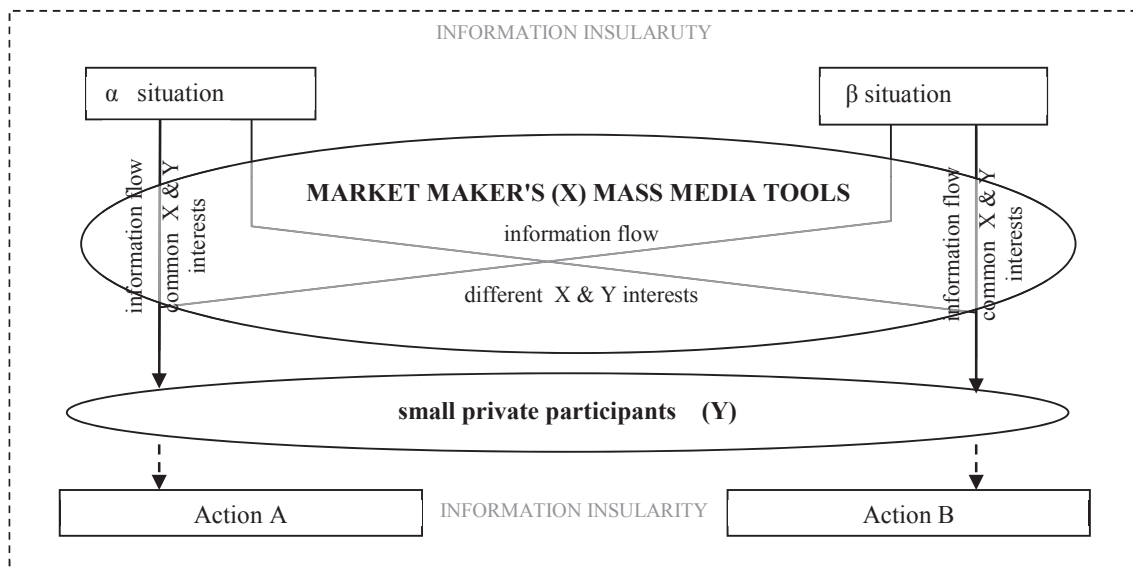


Fig. 2. information insularity and asymmetrical information

Meanwhile, major market participants (market makers) focus their attention on certain specific areas; therefore, they can provide more detailed related information. Major market participants may conceal or provide biased available information. Large market participants can provide information directly to the economic decision-making small market participants, informing them of specific areas where the awareness level is insufficient (see figure 2).

When the goals of major market participants and economic decision-makers coincide, the information will be provided; if their interests differ, then either strategic information is concealed or asymmetric information is provided. One of the problems, constantly arising to market participants, involves information asymmetry, when they, having insufficient information about the financial situation, refer to information provided by a financial services provider, thus often making decisions unfavorable for them. Information asymmetries arise when different information is available to the parties entering into a transaction or interested in it. Information asymmetry is

practically unavoidable because very often transactions occur particularly due to the parties' different expectations for the future. On the other hand, information asymmetries may prevent concluding a transaction. One of the most important tools for dealing with the information asymmetry problem involves increasing the consumers' financial literacy (see figure 3).

The economic rationality concept implicitly requires a rational decision-making of an individual, comparing benefits with potential risks, although it is clear that such a rational economic entity is an obvious idealization of reality. Behavioral characteristics of an economic entity as a person (or company as the sum of people) are not limited solely to rationality in economic terms. It can never be squeezed into the frames of a mere rationality in economic terms.

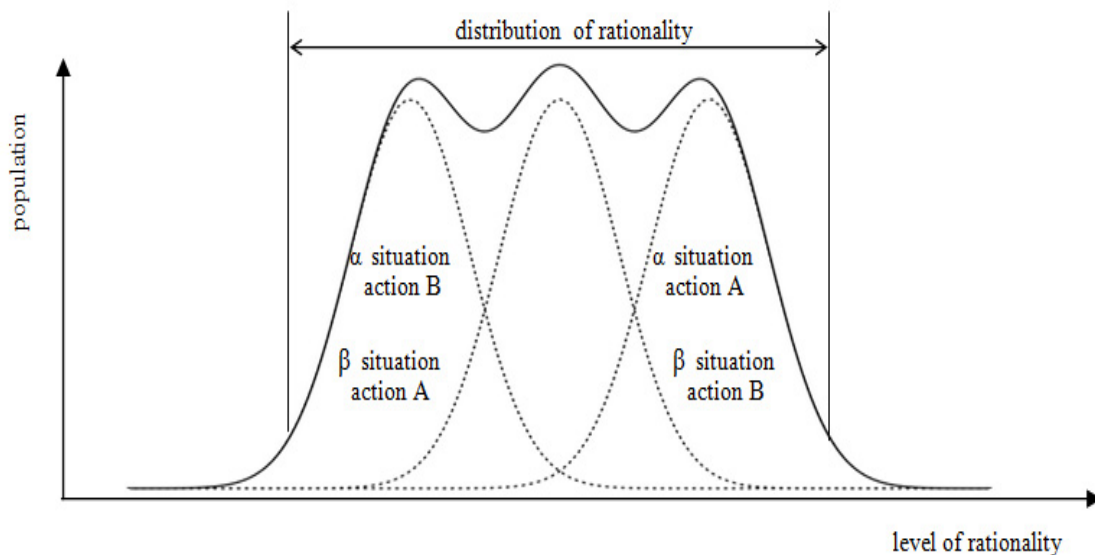


Fig. 3. Gaussian asymmetry and distribution of rationality regarding asymmetrical information and mass education

Purely economic rationality, implemented by economic calculation, is often called substantive rationality, and in case some economic activities and non-economic factors are taken into account - adaptive.

Irrational behavior can emerge within the rational expectations model; on the other hand, in the world of rational expectations and efficient markets, the asset prices reflect the permanently changing and often highly unstable information about fundamental factors that affect the price (Verrecchia). The main critique of the rational expectations model refers to its being based on the assumption that individual agents can store and process in their brain all the related information, whose complexity is much greater than the complexity of the brain; also, financial markets involve many anomalies, which contradict to the rational expectations paradigm. The bounded rationality model is most common, assuming that agents possess limited ability to analyze all available information, thus for decision-making they apply simple rules, when all potentially share the same information, however, they differ in the way this information is interpreted and used (Roa Garcia, 2013; Saariluoma, 1995).

In the twenty-first century another issue emerged, complementing or even distorting both the efficient market theory and the rational expectations model (Goetzmann, William and Rouwenhorst 2005). These are automated investment or trading systems, the so-called trading robots. Over the past few decades, the global financial market has experienced a series of computer disturbances that suddenly terminated all financial transactions. One of the reasons for this short-term inactivity might be related to an unexpected use of very fast trading robots, through which monetary transactions were carried out. Within less than a second's interval of time (currently trading robots reach the speed of 0.001 seconds / per operation), the global financial system gets out of control, the market behavior is transferred to another level, where conventional market theories do not apply anymore and the human reaction is incapable to compete with such a speed, the number of dramatic changes within the market is

significantly increased (Easley, Lopez de Prado & O'Hara, 2012; Conway, 2011). In order to control very fast computer algorithms, first it is necessary to understand their collective behavior, and mathematical models must be able to capture the collective behavior of algorithms by modeling algorithmic actions (Thaler, 1999; Lee, Bernard, Cheng and Koh 2010).

## Acknowledgements

Financial literacy is a challenge for all countries, as financial education has to keep up with the changing market and generations. Attitudes and beliefs, which have been established by the country's economic history and experience, are the most difficult to change. Therefore, part of them will change alongside with the change of generations; this is not exclusively educational initiatives and opportunities to learn that matter; the citizens motivation and interest are important as well. For developing financial literacy, individual target groups should purposefully pursue financial literacy. Especially these with the opinion-forming power, for example, teachers, media representatives and others. Financial education should involve a consistent and coordinated system of targeted actions, but not isolated and short-term projects. Behavioral economics and its closely related scientific field of behavioral finance focus on social, cognitive and emotional factors, underlying people's economic decisions. Behavioral economics combines the impact of psychology and economic sciences in order to discover the underlying reasons for irrational solutions of spending investment, borrowing and savings. Behavioral economics contradicts one of the axioms of conventional economics, which maintains that man is rational, and makes all financial decisions after having thoroughly considered all issues. Economic theory, explaining human decisions in the market, refers to psychological motives. Behavioral theorists argue that human decision-making is not necessarily based on the material or rational grounds; often an individual just follows certain traditions or tries to avoid the risk and trouble. Supporters of the prospect theory, attributed to the behavioral theory, argue that human behavior is often determined by a constant desire to avoid loss rather than a desire to generate revenue. Adaptive rationality is becoming increasingly characteristic in the current market economy. Rational behavior of an economic entity, including economic activities, has become the object of a never-ending debate among philosophers, psychologists, economists and sociologists. Sometimes the reasonableness of the homo economicus assumptions in economic theory is called into question. Economic theory, by simplifying and idealizing reality, explores business activities and formulates the problem as an extreme challenge. Only then the relative rationality of economic activity, achieved in a real economy, is interpreted. An economic entity is exposed to such social factors as the income rate, education, gender, age, etc. A rational economic entity justifies its participation in economic activities, whereas a bounded rationality economic entity perceives benefit as the sum of economic, social and psychological benefits.

## References

- A. Marcet and T. Sargent. The convergence of vector autoregressions to rational expectations equilibrium. In A. Vercelli and N. Dimitri, editors, *A Survey of Research Strategies*. Oxford University Press, Oxford, 1992
- Atkinson, A. and Messy, F. (2012). Measuring Financial Literacy: Results of the OECD / International Network on Financial Education (INFE) Pilot Study, OECD Working Papers on Finance, *Insurance and Private Pensions No. 15*. Paris: OECD Publishing.
- B. Routledge (1999). Adaptive learning in financial markets. *Review of Financial Studies* 12:1165–1202, 1999.
- Barro, R. J. and J. F. Ursua (2009) "Stock-Market Crashes and Depressions", NBER Working Paper 14760.
- Bayer, Patrick, B. Douglas Bernheim, and John Karl Scholz. 2009. The Effects of Financial Education in the Workplace: Evidence from a Survey of Employers. *Economic Inquiry*, 47(4): 605-624
- Berg and Gigerenzer (2010) "As-if behavioral economics: Neoclassical economics in disguise?", MPRA Paper No. 26586.
- Bernheim, B. Douglas (2008) "Neuroeconomics: A Sober (But Hopeful) Appraisal", NBER Working Paper 13954
- Borodich, S., Deplazes, S., Kardash, N., and Kovzik, A. (2010). Comparative analysis of the levels of financial literacy among students in the U.S., Belarus, and Japan. *Journal of economics and Economic Education Research* 11(3), 71-86.
- Buss, D. M. (2009) "How Can Evolutionary Psychology Successfully Explain Personality and Individual Differences?", *Perspectives on Psychological Science*, 4(4), 359-366.
- Conway, B. (2011). Wall Street's need for trading speed: The nanosecond age. *The Wall Street Journal*. JUN 14,
- De Luca, M., Szostek, C., Cartlidge, J. & Cliff, D. (2011). Studies on Interactions between Human Traders and Algorithmic Trading Systems. U.K. Government Foresight Project
- Easley, D., Lopez de Prado, M. & O'Hara, M. (2012). The volume clock: Insights into the high-frequency paradigm. *Journal of Portfolio Management* 39, 19–29.

- Easley, David and Jon Kleinberg (2010), *Networks, Crowds, and Markets: Reasoning about a Highly Connected World*, Cambridge University Press.
- G.W. Evans and S. Honkapohja. (2001). *Learning and Expectations in Macroeconomics* Princeton University Press,
- Goetzmann, William N. and K. Geert Rouwenhorst (2005) *The origins of value: The financial innovations that created modern capital markets*, Oxford University Press.
- Lee, Bernard, Shih-Fen Cheng and Annie Koh (2010) “An Analysis of Extreme Price Shocks and Illiquidity among Systematic Trend Followers”, *Review of Futures Markets*, 18:4, 385-419.
- R. Guesnerie. *Assessing Rational Expectations 2: ‘Eductive’ Stability in Economics*. MIT-Press, Cambridge Mas, 2005.
- R. Verrecchia. Information acquisition in a noisy rational expectations economy. *Econometrica*, 50:1415–1430, 1982.
- Roa Garcia, M.J. (2013). Financial education and behavioural finance: New insights into the role of information in financial decisions. *Journal of Economic Surveys* 27(2), 297-315
- Roubini, Nouriel and Stephen Mihm (2010) *Crisis economics: A crash course in the future of finance*, Penguin Press
- S.J. Grossman and J. Stiglitz. On the impossibility of information ally efficient markets. *American Economic Review*, 70:393–408, 1980.
- Saariluoma, P. (1995). *Chess Players’ Thinking: A Cognitive Psychological Approach*, Routledge, New York, , p. 43.
- Thaler, R. H. (1999) “The End of Behavioral Finance”, *Financial Analysts Journal*, 55(6), 12-17
- X. Vives. How fast do rational agents learn? *Review of Economic Studies*, 60:329–347, 1993.