In the classical finance the Efficient Markets Hypothesis (EMH) has played the central and dominant role. According to this Hypothesis in the informationally efficient markets current prices fully include expectations and relevant information thus making the price changes unpredictable. There is however a vast empirical evidence that EMH is not always satisfied in the real markets. Additionally, recent developments in the financial markets theory especially the theoretical and empirical findings in the areas of behavioral finance and market microstructure give the explanations to the observed market inefficiencies.

The research projects objectives are as follows. First, we want to investigate the role and the impact as well as the transmission mechanisms of the selected behavioral characteristics (personal traits as risk attitude, information processing predisposition to use heuristics) and the role of emotions (emotional assets) and market microstructure aspects (role of the information and parallel trading mechanisms) on the observed financial markets parameters as market prices, returns, volume and liquidity. Second, we want to build mathematical representation of financial and alternative markets that takes simultaneously both behavioral and microstructural aspects into consideration. Third, we want to find the theoretical explanations for the observed markets phenomena as e.g. ex-dividend-day stock price anomaly and observed liquidity on the Warsaw Stock Exchange based on the empirical research and constructed models.

Similar trend can be observed in classical economics, also observed in popular scientific publications as Economics of Good and Evil, Economics 2.0 or Freakonomics.

We will apply different research methods to different aspects. In particular for:

Behavioral aspects

At the first stage of the project, there will be executed laboratory experiments using proprietary economic simulation game run on a virtual, fictional market - under stable conditions and with the speculative bubbles. Professional market participants (traders in the futures market) and amateurs will be invited to participate in the project. Market's participants behavior and performance, such as prognostic strategies momentum-contrarian, disposition effect, risk-taking attitudes, trading volume, frequency of orders, are going to be investigated by methods described in Kubińska and Markiewicz (2008, 2009, 2012), Kubińska, Markiewicz and Tyszka (2012) and Czekaj, Czupryna, Kubińska and Markiewicz (in press). Structural equation models will be used to verify the initial relationships between variables. At the final stage the relevant models - agent based (e.g. Kyrtsoui, Sornette, 2012) and structural equation models (e.g. Bagozzi and Yi, 2012) - will be built and calibrated as to fit to the real markets data. The models will take into account the results of the laboratory experiments.

Market microstructure

The project uses the notion of complex networks as the key concept, resolving the problems of dynamical processes taking place in the microstructure of financial markets. We represent financial market as a complex network of interactions between individual traders and then monitor information stream generated by such a structure. Furthermore our approach is based on the novel concept of large data streams and combines Multiple Input Multiple Output models with Large Random Matrix Models. We propose Bianchi et al. (2011) test, to uncover significant signals from noisy sources and reconstruct the evolution of information in temporal network. Furthermore we develop novel algorithms and robust statistical methods based on random matrix theory to detect changes of the source generating signals that are propagated in temporal networks (Kosiorowski, Mielczarek, Rydlewski, Snarska, 2014). In search of the information sources we will refer to the proposition given by Bai and Ng (2003), who considered matrices with an unobserved structure of interactions described by hidden (latent) factors.