Research Report

IRRATIONALITY IN FINANCIAL MARKETS

The vast majority of the models of neoclassical economics assume rational behavior. On the other hand, one may find a stream of literature trying to prove that real-world decision-makers are not rational. In our project, we explored ways to model the actions of agents labelled '**irrational**' by traditional economic understanding.

What we highlighted in our project is the phenomenon of lack of self-control, which can be characterized by two types of characters: the **naïve** and the **sophisticated** ones. They both have the tendency to change their minds — to procrastinate — when facing an intertemporal choice. Both of them are aware of their self-control problem, but while the sophisticated agent tries to avoid it actively, the naïve makes no such efforts. These non-standard preferences are referred to as **time-inconsistent** ones.

In our first paper 'Pató Pál úr modellezése. Irracionalitás az intertemporális döntéshozatalban [Pál Pató-style modelling. Irrationality in inter-temporal decision-making]' (in Hungarian) we attempt to give a formal definition of the above-mentioned two types of irrational agents. To capture the dynamic inconsistency of these decision-makers, we model their behavior by **hyperbolic discounting**. As planned, the use of such utility functions indeed captures the time-inconsistent preferences of our agents. This paper is published in the journal *Közgazdasági Szemle.*

In order to be able to incorporate such irrational behavior into the realm of financial markets, we need to have at least 3 time periods in our model. Thus, in the second part of our project, we extended the original two-period general equilibrium model to **three time periods**. We show that the CAPM's beta pricing formula can be derived from a three-period general equilibrium model. Furthermore, we demonstrate that Pareto efficiency of the resulting allocation carries over from the two-period model to the extended one. (WP: A Three-Period Extension of The CAPM, *Corvinus Economics Working Papers*). This result also provides the foundation to look at the long-term efficiency of financial markets.

Given our thorough understanding of both irrational behavior and the three-period finance economy, we were ready to turn to our main goal. Having found the proper way to model irrationality and having derived a three-period consumption based CAPM we can combine these findings in a three-period finance economy with irrational agents. In our recent working paper 'Procrastination and Intertemporal Consumption: A Three-Period Extension of The CAPM with Irrational Agents' we manage to prove that the pricing formula not only extends to three time-periods, but it also holds if the decision-makers are naïve or sophisticated. This paper is now *under review* in a Q1 journal; Theory and Decision.

Our final goal would be to introduce heterogeneous agents into our three-period finance economy. In this setting, the main difficulty is how to construct the market return since it heavily relies on the composition of agents. We are currently working on a model with a representative agent, whose behavior is either rational or irrational with a given probability.