Summary of a research project on Computational Economics and artificial markets for greenhouse gases emission rights

I am a PhD student of Università Politecnica Delle Marche, Ancona, (IT) , I have just begun to study the use of multi agent system in computational economics because I am planning to use these in my research project, that is supervised by Prof. Aldo Franco Dragoni (Università Politecnica delle Marche). We are starting a research project about the use of software agent to simulate a new market, his behavior, his trend, how it changes when it is affected by external factor. The idea is to develop a model usable for studying a market for greenhouse gases emission rights. The conference in Venice appears a good chance for exchanging experiences and in particular for knowing what other groups are doing about this topic.

At the beginning our project aims to achieve strong competences to simulate an artificial market, in particular focusing on the learning step of software agents. After that the objective is to develop a multi agent model in which a market such as the EU Emission Trading Scheme (EU ETS) can be simulated. The simulation should give information about the trend of this market, his effectiveness of reducing emission providing a "least cost solution". One possible outcome could be also the observation of the behavior of this market under different conditions, such as different policies for the allocation methods: Grandfathering, Benchmarking, Auctioning or a mix of two of them.

The first phase will be a study of theory and implementation of artificial market, to improve our skill in "Agent Computational Economics" and to develop a first model of agent-based artificial market. This market could be developed using regional data about firms and markets of their goods or building a model for local energy market on the basis of some studies that are already done by other research groups in our university. In this phase the focus will be on the learning step of the agent decision's making process to identify possible alternatives to the GA (genetic algorithm) technique that is often used in these models.

Our idea is to use JADE (Java Agent Development Framework) [1] to develop software agents. Some reasons that have supported the choice of this platform are:

- license: the open source nature of this product;
- interoperability: Jade fully complies with the FIPA standards;
- portability: Jade agents are developed in Java and they are independent from the java virtual machine and networks in which they operate.

In the next phase the work will be focused on the implementation of a multi agent simulation model in

Jade which forms an artificial market designed to simulate an emission trading scheme. Probably the work will be developed starting from a model similar to the one proposed by Matsumoto [2] in which we aim to include features of the European ETS.

The research project is in the preparatory phase, and we think that participating at the conference, even as listeners, could be worthwhile to start our project.

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References

[1] JADE Project Home Page. Available at http://jade.tilab.com/

[2] K. Matsumoto, "Evaluation of an artificial market approach for GHG emissions trading analysis," *Simulation Modelling Practice and Theory*, vol. 16, 2008, pagg. 1312-1322.