Demonstration of a Multi-agent Simulation of the Impact of Culture on International Trade

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Abstract

A multi-agent model of trade in mono-cultural and multi-cultural setting will be demonstrated. The model allows for configuration of cultural background in individual agents, according to the Hofstede's five dimensions of national culture. The model is built as a tool for social-scientific research into the efficiency international trade and supply chain formation, in particular in a context of institutional economics. The emergence of different trade patterns under different cultural settings will be demonstrated.

1 Theoretical background

A series of papers by G.J. Hofstede et al. [1, 2, 3, 4, 5] describe the differentiation of behavior of individuals in trade processes according to the individual's cultural background. The papers are based on the work of G. Hofstede [6], who found that national cultures can be characterized according to five dimensions:

- the extent to which the less powerful in a society expect and accept that power is distributed unequally (power distance, or hierarchical versus egalitarian cultures);
- the extent to which the members of a society can accept that certain things are unknown and that rules for behavior are ambiguous (uncertainty avoiding versus uncertainty tolerant cultures);
- the extent to which the members of a society feel to be individuals responsible for their personal interest or group members responsible for common interest (individualism versus collectivism);
- the extent to which the members of a society are oriented toward performance and competition or toward care-taking and co-operation (masculine versus feminine cultures);
- the extent to which the members of a society pursue status, consumption, and immediate profit, or pragmatically pursue long-run goals and virtues (short-term versus long-term orientation).

The papers by G.J. Hofstede et al. [1, 2, 3, 4, 5] define rules for culturally differentiated behavior of trading agents in the processes displayed in figure 1. The purpose of these models of culture is to advance the understanding of international trade processes and supply chain formation in different mono-cultural and multi-cultural settings, in a context of institutional economics, and to compare the efficiency of institutions. The research method in which the models are applied, combines multi-agent simulation and human gaming simulation, as indicted in figure 2. For examples of such research, see [7, 8].

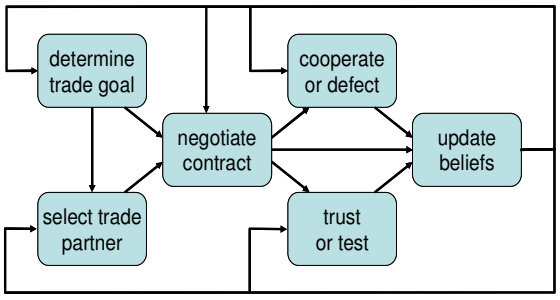

Figure 1. Process model of trading agents

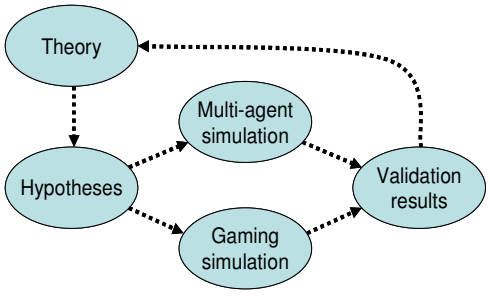

Figure 2. Research cycle

2 Multi-agent Simulation

The simulation application allows for configuring individual agents with cultural parameters, representing the Hofstede dimensions, and some personal traits, like impatience, and negotiation preferences and parameters. Agents have a role of either supplier or customers. They trade a commodity that has a hidden quality attribute, so the suppliers have an opportunity to cheat the customers. The customers can either trust the suppliers, or put their purchases to the test with the tracing agent, that will at the cost of a fee inform them about the real quality, and fine the supplier in case of deceit. A number of suppliers and a number of customers can be configured for a simulation run, with all customers connected to all suppliers. They may freely select a partner and send a trade proposal, and their partners are free to respond or ignore a proposal. Agents can enter into negotiations with only one partner concurrently. They may come to an agreement, or break-off negotiations if they feel there is insufficient progress or the partner makes unrealistic proposals. They may simple not respond any longer to partner's proposals, in which case the partner will start searching for a new partner after waiting for a while. Thus trade patterns emerge, of which some important observables, to be made at group level or for individual relations, are:

- the number of successful transactions,
- the average quality of commodities traded,
- the number of tracing requests,
- the number of revealed/unrevealed deceits,
- the number of failed negotiations,
- average duration of negotiations.

The application that will be demonstrated, has been implemented in Cormas (http://cormas.cirad.fr/indexeng.htm). The demonstration will show the emergence of patterns of some observables in different settings.

References

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