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Agent-based computational transaction cost economics☆

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Abstract

This article explores the use of 'agent-based computational economics' (ACE) for modelling the development of transactions between firms. Transaction cost economics neglects learning and the development of trust, ignores the complexity of multiple agents, and assumes rather than investigates the efficiency of outcomes. Efficiency here refers to minimum cost or maximum profit. We model how co-operation and trust emerge and shift adaptively as relations evolve in a context of multiple, interacting agents. This may open up a new area of application for the ACE methodology. A simulation model is developed in which agents make and break transaction relations on the basis of preferences, based on trust and potential profit. Profit is a function of product differentiation, specificity of assets, economy of scale and learning by doing in ongoing relations. Agents adapt their trust in a partner as a function of his loyalty, exhibited by his continuation of a relation. They also adapt the weight they attach to trust on the basis of realized profit. The model enables an assessment of the efficiency of outcomes relative to the optimum, as

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a function of trust and market conditions. We conduct a few experiments to illustrate this application of ACE.

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1. Introduction

Inter-firm relations in general, and buyer–supplier relations in particular, have increasingly been analyzed by means of transaction cost economics (TCE). However, as has been widely acknowledged, TCE does not include any dynamics of learning, adaptation or innovation. Williamson himself (1985, p. 144) admitted that 'the study of economic organization in a regime of rapid innovation poses much more difficult issues than those addressed here'. A more fundamental problem is that as in economics more in general it is assumed rather than investigated that efficient outcomes will arise. Here, in inter-firm relations, it is assumed that optimal forms of organization or governance will arise, suited to characteristics of transactions such as the need for transaction-specific investments, frequency of transactions, and uncertainty concerning conditions that may affect future transactions (Williamson, 1975, 1985). Two arguments are used for this: an argument of rationality and an argument of selection.

Williamson granted that rationality is bounded and transactions are subject to radical uncertainty, which precludes complete contingent contracting. But he proceeded to assume a higher level of rationality: people can rationally, calculatively deal with conditions of bounded rationality. Aware of their bounded rationality and radical uncertainty, people rationally design governance structures to deal with those conditions. However, if rationality is bounded, then rationality of dealing with bounded rationality is bounded as well. To rationally calculate economizing on bounded rationality, one would need to know the marginal (opportunity) costs and benefits of seeking further information and of further calculation, but for that one would need to decide upon the marginal costs and benefits of the efforts to find that out. This yields an infinite regress (Hodgson, 1998; Pagano, 1999). Here we accept bounded rationality more fully and deal with it on the basis of the methodology of adaptive agents.

When confronted with arguments against rationality, economists usually concede that assumptions of full rationality are counterfactual, and then resort to the argument of economic selection. We can proceed as if agents make rational, optimal choices, because selection by forces of competition will ensure that only the optimal survives (Alchian, 1950; Friedman, 1953). Williamson was