Chapter 5

Discussion

5.1 Conclusions

Experiments with the model show that important processes of market-making are overlooked in TCE. There, the market is proposed as a structure that can be used to organize transactions, while it is ignored that a market has to be made before it can be used. Efficient outcomes are assumed rather than investigated. With the simulation model presented in Chapter 3, however, outcomes can be investigated and understood as the result of the processes that lead to them. In addition, the experiments have shown the need for an analysis at the level of individual agents in order to gain real insight.

In particular, efficient outcomes arise only rarely; many more situations can and do arise than just the optimal ones. It takes a far greater deal of coordination to generate an optimal outcome than individual, boundedly rational adaptive agents are able to achieve among them. Absent a central coordinating agent, it was shown that it is more likely than not that a group of autonomous agents does not ‘find’ an optimal configuration. Individual agents build up long-lasting trust relations with others that stand in the way of the market’s evolution to optimal configurations where economies of scale are fully exploited the way TCE assumes.

More generally, it has to be recognized that the process in which a market is made by the participants involved has important charac-
teristics of its own. There have been several occasions where this has proved important. In particular, the importance of the fact that market-making takes time is higher when the advantage of the market depends on economies of learning than when it depends on economies of scale. On the other hand, the fact that the particular market that is made is just one of many possibilities and that they are not all equally efficient is more important when the advantage of the market depends on economies of scale than when it depends on economies of learning. These are considerations that standard TCE does not incorporate, so that it can never be able to explain some of the phenomena we have found and that are considered relevant in the explanation of organization.

While these conclusion force us to dismiss the (transaction cost) economics approach on the one hand, we now have an alternative approach that can be used to advantage for investigating issues of economic organization and many others, as demonstrated by the wider ACE-population. Global organizational regularities can be 'grown' and examined as the product of decentralized interactions among individual agents. Even though the experiments in the previous chapter have only scratched the surface of the possibilities, the usefulness of the approach has been demonstrated. Many more options remain to be investigated (see Section 5.3), but first, the current approach and model are put in some perspective.

5.2 Discussion

In the introduction, it was mentioned that all possible behavior—with within the multi-dimensional space of possibilities set up in Chapter 3, that is—would be allowed. It was also mentioned, however, that the structure of the model makes it impossible to determine what the optimal behavior is. For all we know, the agents may actually have been behaving

1See the listing of ACE-researchers on the ACE-website at: http://www.econ.iastate.edu/tesfatsi

2The optimum in the sense of each supplier supplying to his maximum number of allowed buyers and generating 'maximum' economies of scale is not behavior; it
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optimally. Notwithstanding the criticism of genetic algorithms given in Chapter 2, a GA can be used to estimate what the optimum is, as precisely the kind of useful benchmark that was suggested in (Klos 1999) and by Tesfatsion (2001, see Section 2.1.2). However, even though a GA was not employed here, results from experiments explicitly comparing a GA with individual learning as implemented in the current model (see also Klos 1999, Friend 1998) do seem to support the conclusion that introspective, individual-based learning does not allow agents to reach levels of performance consistent with population-level evolution as implemented by a GA. Even though the loop has not been closed in this thesis, therefore, it may still be concluded that optimal forms of organization will often not be used and that the process-modeling approach applied in this thesis can yield important insights into the forms of organization that are used and into the reasons those forms rather than others are used. Additional experimentation can also give insights relevant for normative assessments of how to reach particular outcomes.

There are some elements of the model that deserve some discussion. First of all, what does the stability of matches resulting from the DCR algorithm imply about the relations between agents in our model? In other words, how plausible is it that only relations occur that are part of a set of stable matches? The DCR algorithm was used as a means to assign buyers to suppliers or to themselves and not because it yields stable matches, but it does nonetheless. In fact, the matching algorithm was only implemented because of dissatisfaction with the previous, custom-made ‘assignment algorithm’ (Klos and Nooteboom 1998). A matching algorithm provides a neat way of performing this alignment, while the previous version was somewhat ‘messy’ and required a lot of additional assumptions that are already dealt with in the DCR algorithm.

Another point concerns opportunism, trust and loyalty. Opportunism does not really include ‘guile’, which is part of its definition. In our model, opportunism is defined as breaking a relation, i.e. a sequence of consecutive matches. If this is considered simple self-interest seeking,
there is no real guile involved. A method for including guile, along with real transaction costs is suggested below. Furthermore, trust has a base-level, while loyalty does not. An agent’s loyalty can easily be zero, while other agent’s trust in that agent can never be zero, even though zero loyalty does not mean that the agent automatically breaks the relation, but just that he does not value the relation intrinsically. More generally, trust and loyalty are specified quite differently in our model. This is due to path dependence; the model was specified initially with just trust, profit and $a - \tau$ was incorporated later.

5.3 Further Research

It is clear that the surface of possibilities has only been scratched in this thesis. Many more options for extending the model and for further experimentation have been opened up, however. Some options are discussed below.

Guile

One may argue that the agents’ behavior when breaking a relation, although self-interest seeking, does not include guile. In TCE, opportunism is defined as self-interest seeking with guile. Here, trust is trust in (good) intentions, as the complement of opportunism, which is bad intentions; trustworthiness is the absence of opportunistic behavior. An obvious extension of the model would include guile in the modeling of opportunistic behavior. This could be accomplished by letting agents, when they are matched, appropriate some of the returns from investments in specific assets. They could do this with a certain probability that would increase with the amount of these appropriable returns. Other agents’ trust would then come to imply their subjective interpretation of the probability that another agent does not appropriate such returns, while another agent’s breaking a relation is then relegated to simple self-interest seeking and goes unpunished in terms of trust. This allows contracts to be included in the model: an agent would want to invest in a contract to the extent
that he does not trust his partner. This is a very straightforward way of including transaction costs. Trust would then be a way of economizing on transaction costs and this would allow an investigation of when trust pays and of how stable it is in a society of self-interest seekers.

**Adaptive Differentiation**

The buyers could be allowed to adapt the location of their product, in a very literal sense searching a landscape on a multi-dimensional space, namely the product characteristics space (Lancaster 1966, see Section 3.2.2). They could experiment with different values for $d_i$, the differentiation of their product. More differentiated products would require more specialized assets to be invested in and would allow costs to be saved by setting up long term relations. The question is then whether different agents focus on different market-segments and what effect this has on the relations they have with their suppliers.

**Multiple Components**

A more general version of the model would allow for the possibility of multiple components per product and for multiple sources per component. A buyer may then be matched to the same or to different suppliers for the production of the various components; a single supplier may attain economies of scale in the production of different components for the buyer (see Williamson 1981b, note 18, p. 1547), whereas multiple suppliers may gain (external) economies of cognitive scope in their production for the buyer (cf. Nooteboom 1992, Péli and Nooteboom 1997).

**Internal Organization**

In a more complete model, the assumption that buyers calculate their own scores using trust = 1 may be interpreted as the trust they really have in (the intentions of) their own organization. This issue refers to problems of monitoring inside organizations and principle-agent theory. The organization needs to be broken up into its constituent components, just like economic systems have been broken up into individual firms
in this thesis. An organization consists of multiple individuals and the organization's behavior needs to be explained as the result of the individuals' behavior within the organization (cf., for example, Masuch and LaPotin 1989, and Cyert and March's Behavioral Theory of the Firm).

**Durable Specific Assets**

With respect to TCE's *fundamental transformation*, the emphasis in the current model was put on the second option mentioned (between brackets) in Section 3.2.2. As mentioned there, the relative effects of investments in durable specific assets have been investigated using a previous version of the model, but that became too complex because of all the assumptions that had to be made regarding depreciation of assets. The issue is important though: a proper implementation allows dependence due to possible loss of specific investments to be modeled, and allows an investigation of the effectiveness of different regimes for the distribution of ownership and risk of specific investments. This is important because it brings the model closer to transaction cost economic models and therefore allows a more rigorous comparison of the performance of both types of models.