TRADING IN A BLACK BOX: ZERO INTELLIGENCE & LACK OF KNOWLEDGE

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ABSTRACT

We conducted a large number of continuous double auction experiments under private information and in other treatments where even less information is available. Our experiments are designed to investigate convergence to competitive equilibrium, in particular to go beyond rejection by counterexample of the 'does not converge to competitive equilibrium' to a direct test of the alternative. Despite decent statistical power (due to a large number of experimental markets), we cannot reject the 'does converge' hypothesis. Subsequently, we investigate the role of feedback and order book access on trading behavior. On aggregate, we find that restricting access to order-book information slows convergence down and increases volatility. Nevertheless, the typical convergence patterns – initial pricing below competitive equilibrium followed by equilibration through increasing prices – are found to be robust even when no order book access is granted at all. In terms of individual trading behavior, we identify the empirical ingredients that organize the observed initial asymmetries and ensuing equilibration phenomena. The resulting model of behaviorally validated trading behavior is a variant of a 'zero intelligence' trading model with dynamically adjusting constraints that depend on price realizations and own prior bid/ask behavior.

Keywords: Black Box, competitive equilibrium, double auction, experiments, feedback, zero intelligence

1 Introduction

There are two main reasons for humans to act randomly in a complicated strategic situation: no knowledge regarding the underlying causal action-utility relationships and no cognitive abilities to reason about the situation appropriately. In the absence of one or the other, a random choice might be made as the following dialogue exemplifies:[1]

Alice: *Which way should I go?*
Cat: *That depends on where you are going.*
Alice: *I don't know.*
Cat: *Then it doesn't matter which way you go.*

Allowing random choice at each individual level, however, does not imply that everything about the aggregate outcome has to be random too. In some applications, for example when a route network is such that all routes lead to Rome,

[1]We thank Shyam Sunder for pointing out this funny passage from Lewis Carroll's *Alice in Wonderland*.