



ELSEVIER

Available online at www.sciencedirect.com

 ScienceDirect

JOURNAL OF
Economic
Dynamics
& Control

Journal of Economic Dynamics & Control 32 (2008) 2809–2825

www.elsevier.com/locate/jedc

Staggered updating in an artificial financial market

Christophre Georges*

Department of Economics, Hamilton College, Clinton, NY 13323, USA

Received 29 September 2006; accepted 2 November 2007

Available online 28 January 2008

Abstract

We consider an environment in which traders search for trading opportunities and update their forecast rules at random intervals by OLS. The staggering of this updating process across traders allows differences in opinion to persist over time, generating nontrivial price dynamics. The nature of these dynamics is sensitive to the degree of overparameterization of forecast rules relative to market fundamentals.

© 2008 Elsevier B.V. All rights reserved.

JEL classification: D83; D84; E44

Keywords: Learning; Expectations; Agent-based modeling

1. Introduction

This paper considers the behavior of artificial agents in a simple market environment with over-the-counter trading. These agents base their trading decisions on forecast rules which they fit to recent data by OLS. We consider both minimum state variable (MSV) forecast rules and rules that are overparameterized relative to

*Tel.: +1 315 859 4472.

E-mail address: cgeorges@hamilton.edu

URL: <http://academics.hamilton.edu/economics/cgeorges/>

the fundamentals of the market. Agents have limited memory and face random wait times between updates.

Simulation results for the MSV case are consistent with the analytical results of [Honkapohja and Mitra \(2003\)](#). Price dynamics converge to a noisy version of the stationary rational expectations equilibrium. The limited memory of agents causes learning to be incomplete, and there is persistent excess volatility of asset returns. Here, however, this volatility depends crucially on the heterogeneity of expectations which is sustained by the staggering of rule updating across agents.

When agents use overparameterized forecasting rules, the ongoing discovery and adoption of rules far from the MSV rational expectations rule induces heightened volatility, volatility clustering and the occasional formation of explosive bubbles. The frequency of these bubbles is decreasing in the memory of the agents and increasing in the rate of updating (i.e., the rate of learning) and the degree of overparameterization of forecast rules. We also show that the use of overparameterized forecast rules can survive specification testing by agents who wish to avoid overfitting the available data.

Our focus on overparameterized forecasting rules is motivated by [Grandmont \(1998\)](#), who argues that, in the face of model uncertainty, economic agents should be prepared to extrapolate a wide variety of trends from the recent past. This stands in contrast to the recent literature on adaptive learning by agents with misspecified forecasting models that are underparameterized relative to the market fundamentals ([Evans and Honkapohja, 2001](#), Chapter 13; [Cho et al., 2002](#); [Branch and Evans, 2006](#)).¹ The model is closer in spirit to that of [Bullard et al. \(2007\)](#), who consider ‘add factors’ in forecasts.²

There is now a large literature on heterogeneous agent and agent-based models in finance (as for example surveyed by [Hommes, 2006](#); [LeBaron, 2006](#); [Samanidou et al., 2007](#)). Whereas many extant models (e.g., [Lux, 1995](#); [Alfarano and Lux, 2007](#); [Brock and Hommes, 1998](#); [Boswijk et al., 2007](#); [Chiarella and Iori, 2002](#); [LeBaron and Yamamoto, 2006](#)) focus on the interaction of a small number of trader types, we allow for a continuum of technical forecasting rules. This continuum includes rules that are consistent with a variety of momentum and fundamentalist type beliefs as well as rational expectations. Agents employ a straightforward method of rule updating (OLS), and the staggering of rule updating is the sole source of heterogeneity across agents.

Other models of expectational heterogeneity that have been proposed in the economics and finance literatures include the ‘sticky information’ approach to the Phillips curve offered by [Mankiw and Reis \(2002\)](#), [Carroll’s \(2003\)](#) model of information diffusion, stochastic choice models such as that used by [Brock and Hommes \(1998\)](#), and [LeBaron’s \(2001\)](#) model with heterogeneity of memory length.

¹Those models often possess ‘restricted perceptions equilibria’ or ‘misspecification equilibria’ that are stable under learning. Expectations at these equilibria cannot be rational (due to the underparameterization of forecast rules), but they are confirmed by the data given the misspecification.

²Another related paper is [Adam et al. \(2006\)](#), in which agents forecast growth rates in a nonstationary environment.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات