



Exchange rate fluctuations in an economy with noise traders

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Abstract

This paper analyzes the stability of the exchange rate in an economy with noise traders. Noise trading is restricted to agents investing in the domestic stock market. The agents pricing foreign exchange hold rational expectations. Monetary policy is affected by the behavior of investors in the domestic stock market and in turn affects fundamental stock evaluations as well as noise trading. We show that when monetary policy affects only fundamentalists bifurcation appears in the exchange rate. When monetary policy also affects noise trading, fixing the exchange rate or switching to a low money growth rule imply stock bubbles converge to zero.

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1. Introduction

There is a growing literature in financial economics on price dynamics in markets with heterogeneous agents. A typical heterogeneity found in this literature is the distinction between noise traders who use technical trading rules and fundamentalists who are concerned with discounted expected future dividends. Theoretical models of noise trading have been motivated by empirical evidence which supports the view that speculation is an important force in the market, see Brock et al. (1992), LeBaron (1999) and Schleifer and Summers (1990).

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Seminal work in the area of noise trading focussed on the effects noise traders have on prices rather than their behavior, see Summers (1986) and De Long et al. (1990). Brock and Hommes (1997, 1998) present a framework for modelling investor behavior. Their model analyzes stock market dynamics when investors choose to be fundamentalists or noise traders.

In this paper, we are concerned with noise trading in the stock market and a mechanism whereby it spills over to the foreign exchange market. This involves building bridges between Brock and Hommes (1997, 1998) and a well-known model of the exchange rate presented in Flood and Garber (1983). The market is segmented in the sense that the agents who select to be noise traders are present only in the domestic stock market. Exchange rates are determined by sophisticated investors who hold rational expectations. The motivation is that foreign exchange traders are professionals whereas many stock investors are relatively uninformed individual agents.

To model the stock market-exchange rate system, we alter Brock and Hommes (1997, 1998) so that the money supply affects stock evaluations. The motivation for introducing this connection between monetary policy and stock prices comes from the observation that expectations of policy changes by the Federal Reserve can trigger large stock market fluctuations. The model also allows endogenous fluctuations in the stock market to affect the diffusion governing money supply growth. The result is that endogenous fluctuations from the stock market create endogenous fluctuations in the exchange rate.

The paper analyzes two cases. In the first monetary policy affects fundamentalist evaluations of the stock but not noise trader evaluations. This produces bifurcation results for the exchange rate which mirror the bifurcation results contained in Brock and Hommes (1997, 1998). In the second, monetary policy also affects noise trading. It is shown that if the government fixes the exchange rate speculative bubbles will vanish from the stock market over time. The same result can be obtained if at a random time the government switches from a random to a deterministic monetary policy.

The paper is organized as follows. Section 2 extends the stock market model of Brock and Hommes (1997, 1998). Section 3 presents the exchange rate model. Sections 4 and 5 present the bifurcation and metastability results respectively. Section 6 concludes and Appendix A presents the proofs.

2. The stock market model

The stock price evolves in discrete time and depends on the percentages of agents who are fundamentalists and noise traders. All agents in the market are mean-variance maximizers. The distinguishing feature between noise traders and fundamentalists is the expectation of the stock price in the next period. For expositional convenience, fundamentalists and noise traders will be referred to as type one and type two respectively. The expectations of type j at time n are denoted by E_{jn} .

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