On information and market dynamics: The case of the U.S. beef market

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Abstract

The paper investigates the nature of dynamic prices and expectations in a competitive market. The approach is applied to the U.S. beef market, which exhibits cyclical patterns and significant biological lags in the production process. Beef price equations are estimated under different expectation regimes. The empirical results indicate the presence of heterogeneous price expectations, with a significant number of market participants neglecting information about the existence of a beef cycle. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

Uncertainty is a pervasive characteristic of dynamic resource allocation: it changes over time as economic agents learn about their environment. Much research has attempted to evaluate this learning process, along with its effect on resource allocation. A major research focus has been on the characterization of expectation formation (e.g., Chow, 1989; Eckstein, 1984; Evans and Ramey, 1992; Ezekiel, 1938; Goodwin and Sheffrin, 1982; Holt and Johnson, 1989; Muth, 1961; Nerlove, 1958; Nerlove et al., 1979; Nerlove and Fornari, 1993; Orazem and Miranowski, 1986). They include naive expectations (where future expected values are set equal to the latest observation of the corresponding variable; see Ezekiel (1938)), adaptive expectations (where expectations are revised over time proportionally to latest prediction error; see Nerlove (1958)),

quasi-rational expectations (where expectations are consistent with the time series model of the corresponding variable; see Nerlove et al. (1979)), as well as rational expectations (Muth, 1961).

Since its introduction by Muth, the rational expectation hypothesis has occupied a central place in the discussion. The rational expectations hypothesis states that decision-makers make efficient use of information, just as they do of other scarce resources. The issue then is to evaluate the exact meaning of 'efficient use' of information. If obtaining and processing information is costly, then optimal learning is expected to depend on the net benefits of learning. When some new information is costly or difficult to process, it may not be used by decision-makers (e.g., Conlisk, 1996; Sargent, 1993). In such situations, simple rules of thumb for expectation formation (e.g., naive expectations) could be used. Also, the ability to obtain and process information may vary across individuals. For example, differences in education or experience could imply different learning rates across individuals, ceteris paribus. The costs and benefits of information being individual specific, different individuals may have different expectations. At the aggregate level, dynamic resource allocation would then be influenced by the heterogeneity of expectations among decision-makers.

The objective of this paper is to investigate the nature of expectation formation and dynamic pricing, with an empirical application to the U.S. beef market. Much research has focused on describing and explaining the beef cycle (e.g., Fisher and Munro, 1983; Foster and Burt, 1991; Jarvis, 1974,1986; Maki, 1962; Munlak et al., 1995; Mundlak and Huang, 1996; Paarsch, 1985; Rosen et al., 1994; Rucker et al., 1989; Trapp, 1986). In some respects, the presence of the beef cycle can be disturbing for economists. If a predictable cycle existed, then producers responding in a countercyclical fashion could earn larger than normal profits over time. In the presence of predictable price movements, countercyclical production response could possibly smooth out market fluctuations, causing the cycle to disappear. Recent research has shown that rational expectations and efficient decisions do not necessarily imply the absence of economic cycles. In particular, Chavas and Holt (1995), Rosen (1987), and Rosen et al. (1994) have argued that an economic cycle can be fully consistent with the efficient management of an animal population under rational expectations. Also Hommes and Sorger (1998) have shown that cyclical and chaotic market equilibria can arise under self-fulfilling expectations (where the perceived and actual laws of motion have the same mean and autocorrelations).

The assumption of naive or adaptive expectations, dating back to Coase and Fowler (1937), Ezekiel (1938) and others, has been a basic premise in much of the literature on livestock supply response (e.g., Foster and Burt, 1991). But the dynamics of price expectations by market participants can influence price and market dynamics. This raises the issue of whether the nature of rationality could