

The paper is organized in six sections: (1) the introduction, (2) a summary of previous experimental findings related to the trading institution and environment laid out in section 3, (4) an overview of the results of the experiments conducted, (5) a section on the hypotheses and results, and (6) a summary of the findings. I will focus on the research questions and results of this study as outlined in the sections 1, 5 and 6. Sections 2-4 will be discussed only briefly.

Introduction and Purpose

Theory of common stock valuation holds that a stock's current market value tends to converge to the risk adjusted discounted present value (PV) of the rationally expected dividend stream. Accordingly, stock price changes should only be observed if new information changing the investor's expectations can be observed. This paper tries to shed some light on the pattern and the formation of endogenous expectations as observed in an experimental spot asset market. The paper distinguishes between rational expectations in the sense of Muth (REM) and rational expectations in the sense of Nash (REN). The difference between the two is that REN implies only that expectations are sustained (or reinforced) by outcomes, while REM implies that expectations are sustained by outcomes that in turn support the predictions of some theory. Both rational expectation models are examined in a laboratory environment with finite trading horizon in which the dividend distribution and the trader's knowledge of this distribution can be controlled.¹ Using REM-theory, the authors propose that although deviations from risk-adjusted dividend value might be temporarily sustainable by divergent individual expectations, such deviations cannot persist because of the uncertain profits potentially earned by arbitraging the asset's price against its expected dividend value. Consequently, individual adjustments will occur until any risk differences are compensated, and expectations become common and coincide with dividend value. Current theory, however, makes no predictions as to how long this will take, and whether, or in what form, this process can be characterized. Do changes in the asset's dividend value, the evolution of agent's price expectations, and the asset's price adjustment converge as expectations become more

[•] Critical summary of: Bubbles, Crashes, and Endogenous Expectations in Experimental Spot Asset Markets by Vernon L. Smith, Gerry L. Suchanek, and Arlington W. Williams (Econometrica, Vol. 56, No. 5, September 1988). Literature used:

Muth, J. F.

(1961) Rational Expectations and the Theory of Price movements, reprinted in Lucas, R. E. and Sargent, T. J., Rational Expectations and Economic Practice, Vol. 1, University of Minnesota Press, 1981, 3-22

Kagel, J. H., Roth, A. E.

(1995) The Handbook of Experimental Economics, Princeton University Press

Nash, J. F.

(1950) The Bargaining Problem, Econometrica, 18, 315-335

¹ It is important to note that there is no possible distinction between REN and REM as long as dividends can not be controlled.

homogeneous? One of the points of this article is to show the difference between common information and common expectations/ rational expectations. Prior experiments were based on the assumption that subjects needed differing dividends in order to create trading activity. The paper shows that not only is this requirement unnecessary for the observation of trading activity (and speculative bubbles in particular), but in addition, the public posting of instructions and dividends (or for that matter the PV's of the expected values of the shares) merely achieves common information – not common knowledge (CK) in the sense of rational expectations.

There is no a priori basis to assume that initially all traders will expect other traders to react in the same way to the same information. The question therefore is whether through learning within and/or across (lab or field) markets agents will come to have rational common expectations and thus produce a no-arbitrage equilibrium. To answer the following three questions is the objective of the paper:

1. Will economic agents trade an asset whose dividend distribution is CK?
2. If so, can we characterize (empirically) the price adjustment process, and interpret it in terms of convergence to dividend value?
3. Will we observe price bubbles and crashes as part of the adjustment process, occurring in any or some of the experiments?

The answers to those questions are found in section 5 and 6 of the paper. In section 5, the price adjustment process is studied first from an explanatory individual perspective. It is analyzed whether the subject's price forecasts are accurate and valuable, and how they are formed. In a further step the question is raised whether a convergence to REM can be observed with increasing experience. The second part of section 5 deals with the aggregate data on adjustment dynamics and tries to derive common patterns. In section 6, the general conclusion is specified by a subsection on forecasting behavior, a subsection on the empirical characteristics of speculative bubbles and the characteristics of the markets supporting REM.

Institutions, Environments and Behavior

Throughout all experiments the enhanced version of the PLATO computer double-auction institution is used. Traders in this institution are free to enter bids to buy and asks to sell but only the highest bid to buy and lowest offer to sell is displayed to the entire market and is open to acceptance. Trading occurs over a sequence of 15 (or 30) market periods, each lasting a maximum of 240 seconds. At the beginning of each experiment, traders are given an asset endowment and a cash endowment. The individual traders working capital (cash holdings) at any point will

differ from his cash endowment by both the accumulated capital gains or losses via market trading and the accumulated dividend earnings via asset units held in inventory at the end of each trading period. The market is not reinitialized and the participants are paid out their respective earnings after the last period. At the beginning of the experiment, common information is created by instructing all traders on the probabilistic nature of the dividend structure that they will encounter and the total number of trading periods in the experiment. Specifically all traders know about all possible (unit) dividend values that might be drawn (i.i.d.) and the probability associated with each potential dividend value. Further details will not be discussed here due to limitations on the length of this critical overview. In particular, the information readily found in table 1 (p. 1126) has been omitted.²

What have we learned

The experiments conducted of this study were successful in showing the following aspects:

Economic agents will trade assets whose dividend distribution is CK. Consequently, inducing different private dividend values on different traders is not a necessary condition for the observance of trade. It remains unexplained, however, why exchanges, sometimes in large volume, occur when identical probabilistic dividends are to be paid on share holdings at the end of each period. Furthermore, it is possible to characterize empirically the price adjustment process. An empirical regularity using risk neutral and risk adjusted REM hypotheses was observed that might be expressed as a lagged Walrasian adjustment hypothesis in which excess bids are a surrogate for excess (capital gains) demand. The conjecture being that excess bids might be correlated with excess demand because at a price below that which is market clearing, there are more willing buyers than willing sellers, and this might be revealed in the context of the double-auction institution by the simple numerical excess of bids over offers. Traders experience rejection (nonacceptance) of their bids and are motivated to bid higher. The authors admit, however, that they have no insight as to why the endogenous expectations leading to positive or negative excess bids arise. Data analysis is able to create accurate prediction, but remains incapable of explaining the phenomena.³ All of the experiments with experienced and most of the experiments with inexperienced traders support the view that expectations are adaptive and that the adaptation over time leads to REM equilibrium outcomes when asset value “fundamentals” remain unchanged over the horizon of trading.⁴ With increasing experience (behavioral uncertainty decreases), subjects tend

² The interesting idea of using experimenter intervention or inadvertent disruptions have been left out as well.

³ The authors actually add that it might not even be possible to formulate the source of such expectations in terms of traditional dynamic theory.

⁴ Traders know the intrinsic value of the share, and therefore I am not sure if REM is supported if, at the end of the period when it becomes clear that behavior from other traders will not be able to influence the share value any more, the traders actually approach intrinsic value as predicted by REM. My question here is can REM really be regarded as a successfully matching theory in open ended field markets. “We conclude that even these experiments are not an exception to the general conclusion that the REM model of asset pricing is supported only as an equilibrium concept

to acquire common intrinsic value expectations that provide support for the REM-model of asset pricing. The paper concludes that a common dividend and common knowledge thereof is insufficient to induce initial common expectations. This is interpreted to be due to agent's uncertainty about the behavior of others because with experience (trial and error) expectations tend ultimately to converge and yield REM equilibrium. Those results are underscored by the forecast experiments. There is a tendency for the better forecasters to earn more money, therefore suggesting that forecasts are actually used to guide decisions (also an indication that low amounts of money are enough to have the traders state those predictions privately). The adaptive nature of forecast formation is sustained by the fact that forecasts were found to lag. The mean forecast price lies below the actual mean price during booms and above the mean price during crashes. In that sense expectations are adaptive, which means that traders use past experience in order to form forecasts.⁵ This seems to hint at expectations formed according to the REN model that eventually leads to end results also predicted by REM. Since this result is obtained through adaptive learning, especially through learning taking place in period 15, when the market experiment ends (this being my conjecture), I am very skeptical if one can conclude that REM is supported.

underlying an adaptive capital gains adjustment process" (p.1150, final sentence) Since in the field dividends are unknown and the value of assets is strongly dependent on expectations that cannot adapt to incorporate end of period observations, I am not sure if REM actually contributes anything at all to the scientific analysis of asset markets.

⁵ It might be interesting to run an experiment testing signal extraction capacities of the subjects even though such an experiment might be difficult to set up due to self-fulfilling prophecies.