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Endogenous information acquisition with Cournot competition

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Abstract  This paper studies information production in a model where both entry of analysts and their optimal information quality is endogenous. We show existence of the Bayesian–Nash equilibrium and solve for it in closed form. The model displays rich behavior. In particular, we find that the precision of an individual signal will always be bounded from above by the precision of the prior belief on payoff uncertainty. Furthermore, we give examples that contradict the naive intuition about information acquisition. For instance, we show how a change in the cost structure that makes information cheaper decreases price informativeness, while at the same time market liquidity and the amount of resources society spends on information acquisition can change either way. The model gives a simple, fully rational explanation on why the number of analysts following a stock can be quite large. Endogenizing the cost of information by allowing the manager to choose an optimal informational policy, we find a variety of optima that depend discontinuously on the model parameters. As a consequence, among two similar firms, one may find it optimal to attract many analysts, the other will cooperate with only a few.

Keywords Analysist coverage · Informed trading · Disclosure

JEL Classification Numbers G10 · G14 · M41

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1 Introduction

The number of analysts following a stock varies strongly from firm to firm. This has been documented by a vast empirical literature that studies the determinants of analyst coverage, e.g., Bhushan (1989) and Brennan and Subrahmanyam (1995). Many researchers believe that the surprisingly high numbers of analysts following certain stocks can only be explained by behavioral reasons, herding, or time patterns of information arrival. But the decision to follow a stock also implies a choice of how much information to acquire. This paper presents a theory that links analyst coverage with the choice of an optimal research intensity, and thus equilibrium forecast dispersion, a variable that has been shown to explain future stock returns (Diether et al. 2002). Intuition tells us that both of these variables are closely related. We formalize this relationship and study the joint determinants of analyst activity and research intensity in the presence of interaction effects.

In our model, some agents ("analysts") can acquire information which allows them to make forecasts about a stock’s fundamental value. The quality of the information can also be chosen and we make the natural assumption that the cost of acquiring information is increasing in its precision. Thus, analysts must decide whether to become informed and, if so, the amount of information to acquire. The rest of the model is in the spirit of Kyle (1985). The benefit of acquiring information comes in the form of trading gains at the expense of uninformed traders in the market. Analysts behave strategically in the Cournot sense. As analysts choose their research intensity and trading aggressiveness, they take the behavior of other analysts and the effect of their own decisions on them into account. Prices in the model are set by competitive market makers. We define the Bayesian–Nash equilibrium and proceed to show existence. The equilibrium is solved for in closed form, and it is shown to be unique among the class of equilibria in which informed agents behave symmetrically and trading strategies and the market maker pricing rule are linear.

We find the following results. In equilibrium, the optimal research intensity is a constant multiple of ex ante payoff uncertainty. This multiple is exclusively determined by the convexity of the cost function; other parameters, such as the extent of liquidity trading, play no role. With a convex cost function, analysts will never acquire very precise signals. In fact, the precision of an analyst’s forecast will never exceed the precision of the prior belief on payoff uncertainty. This is a direct consequence of the interaction of entry of analysts and endogenous choice of information quality. Intuitively, high signal precision will lead to high trading profits, which will encourage the entry of new analysts. This, in turn, will reduce the optimal research intensity.

The model has rich comparative statics. In particular, it allows us to study how the cost structure of information acquisition affects price informativeness and market liquidity. Without endogenous precision choice (as in Admati and Pfleiderer 1988) cheaper information will always lead to more informative prices. In our model with endogenous information quality, however, cheaper information can lead to less informative prices when the payoff uncertainty is sufficiently small. In fact, cheaper information can result in a less informative stock price, while at the same time market liquidity deteriorates and the amount of resources society spends on information acquisition increases.