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Insider competition under two-dimensional uncertainty and informational asymmetry

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ABSTRACT

This paper shows that the consideration of two-dimensional uncertainty affecting cash flows and the existence of multiple, heterogeneously informed insiders provide reversed findings concerning aggregate insider trading profit and market liquidity. In particular, it is shown that heterogeneously informed insiders trade more aggressively. This sensitizes market makers and aggravates illiquidity. As a result, aggregate trading profit of two insiders is greater compared to one monopolist whereas traditional models state that competition increases liquidity and reduces total trading profit. Hence, from a welfare perspective, competition among insiders may be counterproductive.

1. Introduction

In the Kyle (1985) model of informed trading in a financial market, a risk neutral insider receives private information about the payoff of a risky asset. The insider seeks to maximize expected individual trading profit and trades based on his private information. Thus, he reveals parts of his private information which is incorporated into the price. The insider camouflages his trade with noise traders' demand. A competitive market maker observes the total order flow and sets the price to clear the market.

Later works on insider trading mostly concentrate on regulatory policies and welfare analysis by employing a Kyle-type setting (e.g., Shin, 1996). Such studies basically agree that competition among insiders causes them to trade less aggressively because of a crowding out effect (e.g., Fishman and Hagerty, 1992; Khanna et al., 1994). Because of this, prices become less sensitive to the total order flow. This increases market liquidity. However, this only holds when competing insiders are homogeneously informed. Changing the information structure leads to different findings with respect to both, liquidity and welfare. In particular, the present paper assumes that there are two independent sources of uncertainty which affect the payoff of a risky asset. In reality, there are multiple sources of uncertainty. For example, cash flows may depend on production technologies and on the demand for the firm's products. Consider an economy where traders are endowed with different types of information. Each insider learns about one source of uncertainty. That is, for example, one insider learns

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about a technological shock whereas another insider learns about a demand shock. Such shocks may be independent (e.g., Bade and Hirth, 2016).

This paper shows that insider trading in an environment with two-dimensional uncertainty provides reversed findings concerning aggregate insider trading profit and market liquidity. That is, in such market, competitive pressure on informed traders is lower. Thus, they trade more aggressively than homogenously informed insiders. This sensitizes market makers and reduces market liquidity. As a result, insiders generate greater aggregate trading profit compared to a monopolistic insider. This is in contrast to findings in the literature since competition among insiders is assumed to increase liquidity and reduce total trading profit. Changing the structure of uncertainty and the information distribution thus leads to significantly different results concerning the effects of competition among insiders. Hence, this paper motivates to reevaluate both, the effects of insider trading in general and regulatory policies facing the negative effects of insider trading.

The paper is organized as follows: Section 2 presents the model. Section 3 presents the results and concludes.

2. The model

There is a publicly traded firm consisting of an asset in place. The cash flow from the asset in place is given by:

$$\theta = \theta_1 + \theta_2.$$

The two different components θ_1 and θ_2 of the cash flow are independent and normally distributed with means zero and variances v_1 and v_2, respectively. Think of a cash flow having market related sources of uncertainty described by θ_1 (e.g., demand shock) and firm related sources of uncertainty represented by θ_2 (e.g., technology shock).

In the secondary market, there are two heterogeneously informed insiders. Both insiders learn private information about one of the components, that is, one insider learns $s_1 = \theta_1 + \epsilon$ whereas the other insider learns $s_2 = \theta_2 + \xi$. ϵ and ξ are independent biases and normally distributed with means zero and variances v_ϵ and v_ξ, respectively. The quality of private signals is defined as $q_1 = \frac{v_1}{v_1+v_\epsilon}$ and $q_2 = \frac{v_2}{v_2+v_\xi}$.

Furthermore, there are uninformed investors (noise traders) with aggregate demand d_n which is normally distributed with mean zero and variance v_n. In addition, there is a competitive market maker with no private information. Based on their private information, insiders submit orders without price limit to the market maker. These orders plus the aggregate demand of uninformed investors add up to the total order flow $D = d_1 + d_2 + d_n$ which is observable by the market maker. Conditional on D, the market maker sets a price to clear the market.

3. Results

Because all random variables are independent and normally distributed, the trading game has a tractable linear structure. Based on his information set after receiving a private signal, insider $i \in \{1, 2\}$ maximizes expected trading profit to calculate his optimal demand function d_i. The maximization problem is given by:

$$\max_{d_i} d_i(E(\theta|s_i) - E(P(D))).$$

As in Kyle (1985), the pricing rule of the market maker is a linear function of the aggregate order flow $P(D) = \alpha + \beta D$. With this pricing rule, insider i's optimal demand is a linear function of his conditional expectation of the future value of the payoff, i.e.:

$$d_i = \delta + \mu E(\theta|s_i),$$

where

$$\begin{aligned} E(\theta|s_i) &= E(\theta) + \frac{cov(\theta, s_i)}{var(s_i)}(s_i - E(s_i)) \\ &= q_i s_i, \\ \delta &= -\frac{\alpha}{2\beta}\ . \end{aligned} \tag{1}$$

and

$$\mu = \frac{1}{2\beta}. \tag{2}$$

In contrast to the privately informed traders, the market maker observes total order flow which he cannot break down to its components. His expectation of the payoff conditional on D corresponds to the price he sets in equilibrium:

$$\begin{aligned} P(D) &= E(\theta|D) \\ &= E(\theta) + \frac{cov(\theta, D)}{var(D)}(D - E(D)). \\ &= \alpha + \beta D, \end{aligned}$$

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