



## Insider trading with different market structures <sup>☆</sup>

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### ABSTRACT

The recent theoretical research on the informational effect of insider trading in the spirit of Kyle (1985) and Jain and Mirman (1999) was mainly interested in the interaction between the financial and real decisions of the insider, taking into consideration different market structures in both the real and financial markets. However, none investigated the importance of the competition structure in the financial market modeled alone, on the dissemination of information. In this paper, we highlight the effect of the competition structure in the financial market on information revelation. For this purpose, we first extend Jain and Mirman (1999) to incorporate: (i) Cournot competition among the insiders (Model I) and (ii) Stackelberg competition between the insiders (Model II). We then add a real market to Model II, where the publicly-owned firm is a quantity-setting monopolist (Model III). The last model allows to investigate where does the real market interfere relatively to Model II. We show how the equilibrium outcomes are affected by each of the market structure and we perform a comparative statics analysis between the models.

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## 1. Introduction

Insider trading is considered as one of the most notorious methods of stock fraud, in which an individual involved with a company whose stock is publicly traded, shares or sells information with regard to an event involving that company. Typically, this information is not only unavailable to the public, but is also expected to alter the behavior of the company's stock, resulting in profit opportunities of illegal nature. Insider trading has had some landmark incidents or scandals that helped define exactly what it is, starting with the Chase National Bank case in 1929. Newer scandals can also be cited such as the Enron Corporation Case in 2004 and the New Castle Funds case in 2010. All these scandals reflect the different types of inside-relationship and outside-connection of corporations.<sup>1</sup>

The recurrence of insider trading scandals has renewed the academic interest in this topic. Much of the theoretical research has centered on two issues: the public desire of implementing regulations and laws which prohibit insider trading (Dow and Rahi (2003), Leland (1992), Manove (1989)) and the dissemination of information that was first captured by Kyle (1985) in his seminal work on insider trading (Caldentey & Stacchetti, 2010; Cheng, Davidson, & Leung, 2011; Liang, Lin, & Syu, 2010; Liu & Zhang, 2011; Rochet & Vila, 1994).

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<sup>1</sup> For a reference book, the reader can check O'Hara (1995).

The work of Kyle (1985) has constituted the cornerstone for subsequent works on the informational effect of insider trading. In the Kyle model, there is an insider who knows the value of the stock and a market maker who only knows the distribution of the values of the stock, gets information from the total noisy stock order flow, and sets the stock price in a way that his expected profits are zero. The main result is that the stock price reveals half of the inside information, regardless of the parameter values. When the market maker is allowed to observe, in addition to the total order flow, another signal of the value of the asset, like in Jain and Mirman (1999), the stock price becomes more informative and the insider's profits decrease with respect to Kyle (1985).

Jain and Mirman (2000), following Kyle (1985), studied the effect of insider trading on the real decisions of the firm. In order to accomplish this task, they added a second signal in order to account for public information available to the market maker. In order to study the effect of information revelation from the decision of the insider, they separated the informational effect of the second signal from the effect of real decision in Jain and Mirman (1999). Jain and Mirman (2002), Daher and Mirman (2006, 2007), Wang, Wang, and Ren (2009) and Wang and Wang (2010), then explored, the impact on information revelation, of various types of speculative markets in the spirit of Kyle (1985) and Jain and Mirman (2000), by modeling the financial and real sectors together. The idea behind the introduction of the real sector is that the insider's information is due to his participation in the real activities underlying the financial assets that are the object of insider trading. In Jain and Mirman (2000), the insider (or trader) is also the manager of the firm that acts as a quantity-setting monopolist in the real sector. Cournot competition in the real sector is added to this model in Jain and Mirman (2002). Both papers show that the amount of information incorporated in the stock price, which is the same in both papers, increases with respect to Kyle (1985), but is the same as in Jain and Mirman (1999). In other words, the introduction of the real sector does not affect the amount of information revealed. However, the insider's profits are, in both papers, lower than Kyle (1985). The insider's profits and his compensation scheme are lower in Jain and Mirman (2002) with respect to Jain and Mirman (2000), due to Cournot competition in the real sector.

Daher and Mirman (2006, 2007), Wang et al. (2009) and Wang and Wang (2010) extended Jain and Mirman (2000, 2002) to include competition in the financial sector. Indeed, there are different types of insiders in the firm, some without any managerial responsibilities (the president and the members of the board of directors, for example), with the objective of maximizing their profits from trading the stock of the firm whose inside information they possess. Therefore, competition among insiders is another form of competition that influences the amount of information disseminated in the stock price. Daher and Mirman (2006, 2007) show that Cournot competition in the financial sector between the owner and the manager increases the amount of information incorporated in the stock price (which is the same between the two papers) with respect to Jain and Mirman (2000, 2002). The profits of the manager sometimes increase and sometimes decrease, relatively to Jain and Mirman (2000, 2002), depending on the variances of the exogenous variables. However, the profits of the manager and the owner are less in the Cournot-real case (Daher & Mirman, 2006) than in the monopoly-real case (Daher & Mirman, 2007). Wang and Wang (2010) introduce Stackelberg competition in the real market to the model of Daher and Mirman (2007) and support the conclusion that competition in the real sector does not affect the degree of information revelation. In Wang et al. (2009), the manager in the lower ladder of the organizational hierarchy takes the order from the owner and makes the decisions in the Cournot-real sector. He acts as a Stackelberg-follower in the financial sector to the owner who is high on the organizational hierarchy and who knows the manager's reaction function. The authors show that Stackelberg competition in the financial sector increases the amount of information revealed and the owner's profits, in comparison with Daher and Mirman (2006). The manager's profits may decrease or increase depending on the exogenous parameters of the model.

The papers, from Jain and Mirman (2000) to Wang and Wang (2010), were mainly interested in the interaction between the financial and real decisions of the insider, taking into consideration different market structures in both the real and financial markets. However, none investigated the importance of the competition structure in the financial market modeled alone, on the dissemination of information. As was done for the monopolist, in this paper in order to show the effect of pure information revelation in the various market structures, we highlight the effect of the market structure in the financial market on information revelation. We start by a natural extension of Jain and Mirman (1999) to include Cournot duopoly in the financial market (Model I). We find that each insider loses the market power and partially controls the stock price. Hence, the stock price reveals more information with respect to Jain and Mirman (1999). The unconditional profits of each insider also decrease. Those results are similar to Daher and Mirman (2007), when compared to Jain and Mirman (2000).

We then investigate the effect Stackelberg competition in the financial market modeled alone, on information revelation (Model II). We assume that, one of the insiders, the owner, is high in the organizational hierarchy and chooses the second insider, the manager, to serve his purpose. In other words, the owner is the leader and knows the reaction function of the manager. This type of financial information asymmetry between the owner and the manager is widely observed in real life. We show that with Stackelberg competition in the financial market (Model II), the manager trades less and hence earns less than in the Cournot case. However, the owner, due to her role as leader, trades more than in the Cournot and earns more profits. We also notice that the price reveals more information in the Stackelberg than in Cournot structure.

We finally take into consideration the real activities of the firm whose stock is traded and assume that the owner, who acts as a leader in the financial model, does not have any managerial responsibilities. Instead, the manager who acts as a follower in the financial market is a quantity-setting monopolist in the real market (Model III). Even though the effect of the real market structure has been widely studied in the previous works, however, we think that introducing monopoly in the real market to Model II allows to investigate how does the real market interfere and where it does. We show that the introduction of the real market does not affect the amount of information revealed with respect to Model II. The same result holds in Jain and Mirman (2000), when compared to Jain and Mirman (1999).

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