Managerial Incentives and Heterogeneous Firms

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ABSTRACT. An industry where managerial firms and entrepreneurial firms coexist is considered. We analyze the effects of increasing competitiveness, defined by the increase in the number of managerial firms, on the equilibrium managerial incentive scheme. Our analysis shows that an increase in the number of managerial firms would induce a managerial firm to tie the incentives more closely to profits. We also compare the equilibrium with the regular Cournot model.

1. Introduction

Considerable attention has been focused on the strategic implications of managerial incentives; see, for example, Vickers (1985), Fershtman (1985), Fershtman and Judd (1987), Sklivas (1987), Reitman (1993), Sen (1993), and Goering (1996). It is noted that the separation of ownership and management provides firms the opportunity to commit to non-profit maximizing behavior. Such “distortion” is a natural outcome of firms’ profit-seeking behavior because it induces favorable responses from competing firms. In this literature, it is often assumed that managers are delegated to make output decisions and are motivated by a linear incentive scheme that combines sales (revenue) and profits. Since in all these studies firms are assumed identical, it remains unclear how the differences in organizational structures among rivals influence firms’ strategic choices of managerial incentives. Such concerns form the basis of the present study.

This note analyzes the choice of managerial incentives in an oligopoly consisting of both managerial and entrepreneurial firms. Our objective is to examine how the number of managerial firms affects the equilibrium choice of managerial incentive scheme. By an entrepreneurial firm, we mean a firm owned and managed by the same person. Consequently an entrepreneurial firm’s owner makes the output decision himself and does not engage in strategic delegation. However, the owner of a managerial firm delegates the output decision to a manager and provides the manager with proper incentives. As in the related literature, our analysis completely eschews the potential agency problems, even though they are certainly important. To simplify the analysis, we also assume that the managerial incentive contracts are common knowledge and non-renegotiable (see Fershtman and Kalai (1997) for analysis of unobserved delegation).

Since the results from the literature indicate that, when firms compete in quantities the strategic use of managerial delegation allows a firm to play more aggressively, in our model the increase in the number of managerial firms may be referred to as increasing competitiveness. Our analysis shows that increasing competitiveness will increase the relative profit incentive offered to the managers. It is also known that a managerial firm’s profits exceed the sum of all the entrepreneurial firms’ profits. Nevertheless, a managerial firm in some circumstances may earn less than in the regular Cournot equilibrium.

The setting considered is seemingly close to the situations in many emerging markets of Asia, Africa, Eastern Europe and Latin America. In those markets, many small and medium-sized entrepreneurial firms compete with large enterprises and the decision-making of those large enterprises often involves managerial delegation. Our model may also shed some light on the managerial delegation of the new high-tech...
industries composed of a large number of small entrepreneurial firms.²

The remainder of the paper is organized as follows. Section 2 describes the model and presents the results. The comparisons with the regular Cournot model and brief concluding remarks are contained in Section 3.

2. The model

Consider an industry consisting of \(k (k \geq 1)\) managerial firm (indexed by \(i = 1, \ldots, k\)) and \(n-k\) entrepreneurial firms (indexed by \(i = k + 1, \ldots, n\)). These firms produce perfectly substitutable commodities at constant marginal cost \(c\). The market demand is assumed to be \(p = A - Q\), where \(p\) is market price and \(Q\) is the industry output. Let \(q_i\) denote the output of firm \(i\) and define \(\bar{Q} \equiv Q - q_i\).

The \(k\) managerial firms face a two-stage competitive situation. In the first stage, the owners simultaneously and independently design the incentive schemes of their managers. After this first stage, the incentive schemes become common knowledge. Then, in the second stage all \(n\) firms simultaneously and independently decide the production levels.

Following the literature, we assume that for each managerial firm, firm \(i\)'s manager is motivated to maximize:

\[
\Omega_i = \alpha_i \pi_i + (1 - \alpha_i) R_i = (A - q_i - \bar{Q}_i - \alpha_i c) q_i, \tag{1}
\]

where \(\pi_i\) and \(R_i\) are firm \(i\)'s profits and sales, respectively. Clearly, the relative profit incentives acts essentially as a shift parameter of the marginal production cost. It follows that the reaction function of firm \(i\) is given by

\[
q_i = \frac{A - \bar{Q}_i - \alpha_i c}{2}. \tag{2}
\]

Clearly letting \(\alpha_i = 1\) yields the reaction function of an entrepreneurial firm. Solving these reaction functions gives us the second stage equilibrium outcome as follows (the second-order conditions are clearly satisfied).

\[
q_i = \frac{A + c \sum_{1 \leq j \leq k} \alpha_j - (k + 1)c}{n + 1}, \tag{3}
\]

\[
q_i = \frac{A + c \sum_{1 \leq j \leq k} \alpha_j + (n + k)c}{n + 1}, \tag{4}
\]

In the first stage, the owner of managerial firm \(i\) chooses, \(\alpha_i\) to maximize profits \(\pi_i\). Since at the symmetric equilibrium \(\alpha_i = \alpha\), it is straightforward to show that

\[
\alpha = 1 - \frac{(n - 1) (A - c)}{(nk + n + 1 - k)c}. \tag{5}
\]

We are now ready to investigate the implications of the equilibrium managerial incentives. Examining Equation (6), we find that \(\alpha < 1\) and \(\alpha\) may be negative when \(A\) is sufficiently large compared with \(c\). This means that regardless of the composition of the industry, it is not the interest of the owners of the managerial firms to base their managerial incentives on profits alone. Moreover, although it seems absurd and unlikely in practice, “penalizing” for profits does occur theoretically when demand is sufficiently large. Proposition 1 follows directly from the fact that \(\alpha < 1\) and \(\partial \alpha / \partial k > 0\).

Proposition 1. Managerial firms always choose to base the managerial incentives only partly on profits. But an increase in the number of managerial firms would induce a managerial firm to tie the incentives more closely to profits.

As noted in the literature, given the opportunity of strategic delegation, each managerial firm would give its manager an incentive to be more aggressive than in the regular Cournot equilibrium. The intuition of Proposition 1 is that, as the number of managerial firms increases, firms would like to hold back the aggressiveness to avoid lowering the market price too much. This observation is in general accordance with the result obtained in Fershtman and Judd (1987), who considered an industry consisting of managerial firms only. What is new from our analysis is that the result also prevails in an industry consisting not only of managerial firms but also of entrepreneurial firms.