Chapter 9

MANAGERIAL INCENTIVES AND COMPETITION

Rachel Croson
*University of Pennsylvania*

Arie Schinnar
*University of Pennsylvania*

**Abstract**

This paper experimentally tests the impact of managerial incentives on competitive (market) outcomes. We use a Cournot duopoly game to show that when managers’ incentives are based on the firm’s *absolute* performance (profits), collusion can be sustained. However, when managers’ incentives are based on the firm’s *relative* performance (their profits relative to the other firm’s profits), this drives the market to the competitive and efficient outcome. These results suggest that regulators need to consider not only the number and concentration of firms in an industry, but also the managerial compensation schemes when deciding how much intervention is appropriate in a given industry.

1. INTRODUCTION

The question of how to motivate managers in order to maximize firm’s profit is an important one, both economically and psychologically. A large literature examines the impact of managerial incentives on effort and performance, especially under conditions of moral hazard, where there exist principal-agent problems. A nice discussion and review of this issue can be found in Prendergast (1999).

In contrast, we are interested in the impact of managerial incentives on collusive outcomes of firms. Thus the experiment reported here builds on the work of Vickers (1985), Sklivas (1987) and Fershtman and Judd (1987). In these papers, the authors theoretically explore the question of which incentive schemes firms might choose for their managers, comparing those which reward managers only on profits with those that reward managers on some combination of profits and revenue (Sklivas) or profits and sales volume (Vickers, Fershtman and Judd).

In this paper, we will compare slightly different compensation schemes; one in which managers are paid as a function of the profits of the firm, and a second where
they are compensated based on their performance relative to the other firm in their industry. Unlike the previous papers, we will focus not on the incentives for the firms to choose one of these compensation schemes over another, but instead experimentally explore how managers act when compensated by each one.

We use a symmetric Cournot duopoly setting with perfect information and no uncertainty. When managers are compensated based on firm profits, the equilibrium of the game involves collusion. However, when managers are compensated based on relative profits, the equilibrium devolves to the perfectly competitive outcome. We test this simple theory in an experiment. Participants play a series of one-shot Cournot games in a strangers design. We find, consistent with the theory, that individuals produce significantly less quantity (are more collusive) when they are compensated based on their absolute performance than when they are compensated based on their relative performance.

These results are useful on a number of dimensions. First, they provide psychological support for the theory and its predictions. Second, they highlight the importance of firms’ choice of managerial incentives to maximize own profit. Finally, they highlight an additional tool that regulators may have in preventing collusion – they can monitor executive compensation in addition to (or perhaps instead of) output in markets where collusion is suspected.

The remainder of this chapter is organized as follows. Section II introduces the Cournot setting and derives predictions using the parameters from the experiment. Section III presents the experimental design and implementation that we used. Section IV describes our results and section V concludes.

2. COURNOT COMPETITION

This model incorporates the basic Cournot intuition. Two managers work for symmetric firms and face a known (and here, linear) demand function. Each faces marginal costs (here, constant) and independently chooses the quantity their firm will produce. We assume that the manager chooses the quantity his firm will produce so as to maximize his own earnings, given his compensation package. We examine two cases, first, the case in which each manager is compensated with a fraction of his firm’s absolute profits and second, the case in which each manager is compensated based on his profits relative to the other firm.

In the experiment, we use the following parameters:

\[ \text{Demand function: Price } = 100 - (q_1 + q_2) \]
\[ \text{Marginal cost: }$10 \text{ per unit} \]

Case A. The manager is compensated based on a fraction of his firm’s profits; in the experiment he earns the firm’s profits divided by $1000. Thus for each $1000 of firm profits, he earns $1. Manager \( i \) thus maximizes his earnings by solving the following problem.