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Optimal sales force compensation☆

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ABSTRACT

We analyze a dynamic moral-hazard model to derive optimal sales force compensation plans without imposing any ad hoc restrictions on the class of feasible incentive contracts. We explain when the compensation plans that are most common in practice – fixed salaries, quota-based bonuses, commissions, or a combination thereof – are optimal. Fixed salaries are optimal for small revenue-cost ratios. Quota-based bonuses (commissions) should be used if the revenue-cost ratio takes intermediate (large) values. If firms face demand uncertainty, markets are rather thin, and the revenue-cost ratio large, firms should combine a commission with a quota-based bonus. If word-of-mouth advertising affects sales, a dynamic commission that increases over time can be optimal. When entering a new market or launching a new product, firms should install long-term bonus plans.

1. Introduction

When selling goods to customers, firms rely heavily on personal selling via sales forces. To compensate their sales agents, U.S. firms spend about $800 billion each year, which is almost three times as much as they spent on advertising in 2006 (Zoltners et al., 2008). Empirical studies document a large variety of sales force compensation plans across firms. Based on survey data, Joseph and Kalwani (1998) report that 5% of the 266 analyzed firms completely forgo monetary incentives and exclusively pay fixed salaries to their sales agents. The majority of the firms, however, use some form of incentive pay. Among the firms in the sample, 24% employ only commissions, 37% employ only a bonus scheme, and 35% use both commissions and bonus pay. For implementing bonus pay, firms typically compare agents' realized sales with a predetermined quota. All in all, commissions and quota-based bonuses are the most frequently observed forms of sales force compensation.

In this paper, we analyze an agency-theoretic framework that can explain under which conditions one form of compensation plan dominates another. We employ a dynamic moral-hazard model that allows us to solve for the profit-maximizing compensation plan without imposing any ad hoc restrictions on the class of feasible contracts. We find that those compensation schemes that are common in practice – fixed salary, quota bonus, commission, or a combination thereof – are indeed often optimal. In particular, we can show under which conditions combining a commission with a quota-based bonus maximizes firm profits.

In our model, a sales agent has to sell a product in each of two periods. The agent can influence sales by two types of activities. On the one hand, the agent has to perform some basic tasks that can be easily monitored by the firm. For example,

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a firm can easily check whether a sales clerk is present to answer customer questions or to reload empty racks, or whether a sales representative contacts a customer. On the other hand, a sales agent can actively communicate the advantages of the firm's product in face-to-face encounters and invest time and effort to learn a customer's specific needs, which is hard to monitor. The first type of activities can be costlessly enforced by the firm. However, it is prohibitively costly for the firm to directly enforce that the agent additionally engages in the second type. As a consequence, we can differentiate between two effort levels. If the agent does not engage in the second type of activities, he will only fulfill the basic tasks, which corresponds to "low effort". However, if the agent decides to engage also in the second type of activities to complement the basic tasks, we will speak of "high effort". As the firm cannot observe whether the agent has chosen low or high effort, there is a moral-hazard problem. If the firm wants to motivate the agent to exert high effort, it has to design an adequate sales force compensation plan contingent on realized sales. Sales outcomes can serve as an effective performance measure since they crucially depend on the agent's efforts. We assume that both the agent and the firm observe sales at the end of each period. The agent is protected by limited liability so that his compensation must be non-negative.[2]

For our basic model, we obtain the following results. If the ratio between sales revenues and the agent's effort costs is sufficiently low, the firm pays only a fixed salary that induces low effort in both periods. For intermediate revenue-cost ratios, the firm wants to avoid that the agent always exerts low effort. Optimal compensation is then given by the class of *cutoff incentive plans* that make the agent work hard in the first period, but lead to high effort in the second period if and only if a first-period sale occurred. A central feature of such an incentive plan is that the agent must sell the product in the first period to earn a reward. A quota-based bonus scheme which offers a bonus to the agent if and only if he was successful in both periods belongs to this class of contracts.

For high revenue-cost ratios, optimal compensation is described by the class of *permanent incentive plans* that always induce high effort. The well-known commission scheme, which pays a certain commission rate per sale to the agent, belongs to this class of incentives plans. Importantly, we show that the quota-based bonus and the commission are mutually exclusive as optimal sales force compensation. The advantage of the quota-based bonus over the commission is that the former induces high effort in the first period at lower cost for the firm. However, this also implies that the agent might be demotivated in the second period if it is clear that he cannot make the quota. The firm accepts this drawback only if the potential loss, indicated by the revenue-cost ratio, is not too large. Moreover, for a given revenue-cost ratio, a quota-based bonus is optimal if sales respond either sufficiently little or sufficiently strongly to the agent's effort.

We also consider two variants of our basic model – demand uncertainty and preference uncertainty. In the former case, future demand cannot be perfectly foreseen and may depend on previous sales. We show that, when the firm wishes to induce high effort in both periods, demand uncertainty can imply the optimality of an incentive compensation plan that combines a commission with a quota-based bonus. This is the case when the product market is rather thin, i.e., a first-period sale makes it harder to sell the product in the second period. By contrast, if a first-period sale makes a second-period sale more likely (e.g., due to word-of-mouth advertising), a dynamic commission that increases over time is optimal. We further find that, under demand uncertainty, a commission scheme can exhibit another comparative advantage because the firm might be able to implement the optimal commission even if it has less knowledge on short-term demand developments than the sales agent. In such a situation, the commission is the uniquely optimal permanent incentive plan. Moreover, we show that the three practically most relevant incentive plans – commission, bonus, and a combination thereof – are all unique solutions to the firm's optimization problem when the firm collects sales figures less frequently and hence observes only total sales at the end of the second period. Interestingly, scarcer information on sales performance has no adverse effect on firm profits because the aforementioned incentive plans do not require intermediate sales information.

Preference uncertainty reflects a situation where it is uncertain how customers respond to the sales agent's effort, e.g., because the firm enters a new market or launches a new product. In this case, a commission is no longer optimal. Instead, the firm maximizes profits by either a fixed salary, a quota bonus, or an incentive scheme that focuses on second-period sales. Finally, we discuss how advertising, the infeasibility of long-term contracts, and limited liability of the firm affect the optimal compensation plan. In the latter two situations, the quota bonus as an optimal sales force compensation turns out to be less robust. Our results can be nicely translated into clear empirical predictions, which we discuss in the conclusion.

Our paper closes a gap in the theoretical literature on optimal sales force compensation by providing optimality conditions for the different types of incentive compensation plans that are typically observed in practice. The analysis of optimal sales force compensation under moral hazard goes back to Basu et al. (1985). They consider a single-period setting with a risk-averse agent and show that optimal incentive pay usually is a non-linear increasing function of sales. It is argued that commonly used compensation plans can be seen as a piecewise linear approximation of their optimal contract. Raju and Srinivasan (1996) show that such an approximation indeed only leads to a small loss relative to the optimal contract. While there has been extensive research on optimal single-period sales force compensation (see Coughlan (1993) and Albers and Mantrala (2008) for an overview), the literature on multi-period sales force contracting is relatively scarce. Dearden and Lilien (1990) and Lal and Srinivasan (1993) extend the framework by Basu et al. (1985) to dynamic environments. Dearden and Lilien (1990) introduce production learning effects and show how the compensation plan should be optimally adjusted. Lal and Srinivasan (1993) consider a setting that satisfies the properties for the optimality of a linear incentive scheme as

[2] Limited liability is a common assumption in agency models. See, e.g., Sappington (1983), Innes (1990), Demougin and Fluet (1998), Oyer (2000), Poblete and Spulber (2012), and Kishore et al. (2013).