Journal of Business Research 105 (2019) 293–305

Contents lists available at ScienceDirect

Journal of Business Research

journal homepage: www.elsevier.com/locate/jbusres

Aligning marketing and sales in multi-channel marketing: Compensation design for online lead generation and offline sales conversion

Somnath Banerjee[a,*], Pradeep Bhardwaj[b]

[a] North Dakota State University, 811, 2nd Avenue N, Barry Hall 328, Fargo, ND 58102, United States of America

[b] Department of Marketing, College of Business, University of Central Florida, 4336 Scorpius Street, BA2-309B, Orlando, FL 32816, United States of America

ARTICLE INFO

Keywords:
Multi-channel attribution
Online sales leads
Marketing-sales interface
Sales compensation
Risk aversion

ABSTRACT

Firms engaged in personal selling in business and retail markets tend to invest substantial portions of their marketing budgets on lead generation through marketing agents and conversion by sales reps. However, such an arrangement of marketing-sales interface has often been found to be inefficient due to the multi-channel attribution problem. We use analytical models to find optimal sales compensation designs to solve the multi-channel attribution problem. Findings suggest that contracts involving revenue incentives, lead qualification, and sales autarky leave a gap between the first-best and the achieved profit due to budget balance, costs of lead qualification, and the sales force's lack of specialization in marketing, respectively. An increase in risk aversion favors sales autarky and lead qualification contracts over the revenue incentive contracts while an increase in overall uncertainty favors lead qualification. A certain type of contest (or stack ranking-based pay) achieves first-best profit when uncertainty is moderate.

1. Introduction

> "*Finding the right weighted formula for who (individuals, stores, e-commerce personnel) gets what is the challenge.*"
> — Bob Amster, Principal, Retail Technology Group, in RetailWire (Ryan, 2016)

Retail and business-to-business (B2B) firms selling products in industries that require personal selling (e.g. automobiles, real-estate, financial services, technology products etc.) often utilize multiple types of marketing channels (e.g. online and offline channels) in the process of generating sales. Firms' activities in such sales funnels can be categorized into two broad types: sales lead generation (i.e. generation of information about prospective customers through targeting, prospecting, information dissemination and persuasion), and sales lead conversion into sales through presentation and persuasion. Firms are increasingly using online and telemarketing channels for lead generation, while they continue to use their field sales force for lead conversion (Oldroyd, McElheran, & Elkington, 2011; Levin, 2014). Over $2 billion is spent on lead generation through internet advertising (Interactive Advertising Bureau, 2015). In a study of financial services, Google's research shows that in 48.6% of financial products sold, customers searched online but purchased the products offline (Morgan, 2012). Business press surveys suggest that 65% of consumers conduct online product information searches before stepping into stores (Skrovan, 2017). The size of the customer base that searches for product information online but buys products offline has been estimated to be around 40% for the automotive sector (Karr, 2016) and around 33% for national banks (Joyce, 2018). B2B firms spend around 26% of their marketing budget on web content development, while the figure is 25% for B2C firms (Murton & Handley, 2018). Often firms complement their online lead generation efforts with live chat and telemarketing, too. By some accounts, telemarketing is growing fast and generates in excess of $200 billion in revenues (Cron & DeCarlo, 2009). About 40% of the sales force in large companies is devoted to inside sales, while the number is 76% for smaller companies (Z S Associates, 2014).

There are two common themes across the aforementioned multi-channel contexts. First, leads are generated by a marketing agent, who is different from the sales representative (abbreviated as rep in the rest of the paper). For example, in the case of online content marketing, a web publisher may act as the marketing agent and generate internet leads from his or her web page. Second, while the quality of each sales lead (i.e. the probability that a prospective customer ultimately purchases the product), depends on the effort made by the marketing agent, it is often difficult to measure and verify this effort. Until the sales rep makes an effort to convert the prospective customer, it is not known whether the customer will purchase the firm's product. Firms observe the final sales generated but find it difficult to attribute the

* Corresponding author.
E-mail addresses: s.banerjee@ndsu.edu (S. Banerjee), Pradeep.Bhardwaj@ucf.edu (P. Bhardwaj).

https://doi.org/10.1016/j.jbusres.2019.06.016
Received 31 July 2017; Received in revised form 9 June 2019; Accepted 10 June 2019
0148-2963/

Table 1
Research's positioning in the literature.

Papers	Optimal compensation	Multi-channel context, attribution and/or sales lead management problems	Study of effect of risk aversion and uncertainty	Method	Sales compensation methods compared and analyzed		
					Linear compensation	Lead qualification or monitoring	Contest or stack ranking
Basu et al. (1985)	√		√	GT	√		
Joseph and Thevaranjan (1998)	√		√	GT	√	√	
Kalra and Shi (2001)	√		√	GT			√
Syam et al. (2013)	√		√	GT	√		√
Gaba and Kalra (1999)			√	GT			√
Holmstrom (1982)	√	√		GT	√		
Berman (2018)	√	√		GT			
Li and Kannan (2014)		√		Empirical			
Chatterjee (1994)		√		Empirical			
Sabnis et al. (2013)		√		Empirical			
This paper	√	√	√	GT	√	√	√

GT: Game theory.

revenue between the two agents. These two characteristics of lead generation context create the possibility of free riding by the marketing agent and the sales rep on each other's efforts. This problem is akin to the moral hazard in teams (Holmstrom, 1982) and also a type of multi-channel attribution problem (Kaushik, 2012).

We illustrate the problem with an example. Suppose an automobile dealership gets leads from an affiliate website (additional information about the example is given in web appendix). The firm can provide a variety of contracts to its agents who develop content for the site and generate leads. Once the contractual mechanisms for sourcing of leads are in place, the marketing agents can put in effort to provide informative and persuasive content (e.g., Uribe, Buzeta, & Velásquez, 2016) with search engine optimization (SEO). This effort results in sales leads based on inquiries from the customers through web forms, web calls, or emails. The leads get distributed to the local sales force, which follows up to ensure sales closure. However, incentivizing the marketing agent and the sales employee is difficult because the quality of the intermediate output (i.e. the lead quality), is often uncertain and unobservable. For example, an internet sales lead, in the form of a name and an email address or a phone number, could be for a customer with a latent interest in purchasing products from the firm or for a customer who is going to waste the salesperson's time and not buy anything. As the information provided in the web forms by prospective customers is insufficient to evaluate the likelihood of sales from the leads, the attribution issues arise when sales reps follow up on the internet leads. When return on investment for sales leads is low, the firm cannot single out any one agent for poor performance. The agents foresee these potential problems, so they have less incentive to put forth effort. Empirical evidence supports these arguments. On average sales reps contact about 30% of the leads generated by their marketing departments (Oldroyd et al., 2011; Gartner, 2002). In academic literature, some have coined terms like “sales lead black hole” (e.g., Sabnis, Chatterjee, Grewal, & Lilien, 2013). The possibility of fraudulent internet leads, a practice dubbed as “Click Fraud 2.0” (Web ranking, 2010), can also diminish incentives for sales employees. The issue of revenue attribution in retailing is growing due to the increase in interaction between online and offline channels (Ryan, 2016). For example, attribution was ranked as the greatest challenge in measuring the success of driving in-store sales according to Chief Marketing Officers (CMOs) in a survey conducted by the National Retail Foundation CMO Council (National Retail Foundation, 2014). In the context of automobile retailing, the issue of multi-channel attribution has been covered in Google's research (Gevelber, 2016). The significant upside potential from coordination between marketing and sales in lead generation and follow-up has been demonstrated by Smith, Gopalakrishna, and Chatterjee (2006), and literature reviews have identified the issue as an opportunity for impactful and relevant research (Lilien, 2009; Mantrala et al., 2010).

This problem can be solved by two broad methods. First, by designing a compensation plan that addresses the issue of moral hazard arising due to the lack of observability and measurability of sales lead quality. Second, by developing accurate and cheaper measures of lead quality. In this research, we focus on the first solution. In particular, we ask the following questions. If a firm sources sales leads from marketing agents, then what type of incentive mechanism should it use to maximize their effort and its profits? A compensation design-based solution to the multi-channel attribution problem has been suggested in the industry (Ryan, 2016). For example, Canadian retailers are considering overhauling employee commissions following the growth of online sales (Financial Post, 2016). However, there is less consensus on how compensation needs to be designed in such a multi-channel world. Some sales compensation experts advise incentives based on the final revenue generated (Salesbenchmarckindex.com, 2011) while others suggest incentives based on the number of qualified sales leads (Smart Insights, 2016). Incentives based on self-generated sales leads (e.g., Borzo, 2006; Hedges, 2014) and contests (Cron & DeCarlo, 2009; Kolowich, 2013) are other possibilities. We address the issue of when each of these mechanisms is more efficient and under which conditions? How does the choice between contracts depend on risk aversion, the extent of uncertainty in sales lead quality, or the importance of the marketing activity?

To answer the above questions, we develop an analytic model that includes a profit maximizing firm, its marketing agents who generate sales leads through web content development or telemarketing, and sales representatives who follow up on the leads for sales conversions. The sales response function is an additive function of lead quality, which is a function of marketing agent's effort, and sales rep's effort, but the firm is only able to observe final sales and not the lead quality.

Our paper is organized as follows. In Section 2, we discuss related literature and then model, results and conclusions in Sections 3, 4, and 5, respectively.

2. Literature review

Our research primarily relates to the literature in marketing and economics on sales compensation, team moral hazard, multi-channel attribution problems and sales lead management. For the positioning of this research with respect to the literature, refer to Table 1.

In marketing there is a well-established stream of research on sales compensation (Basu et al., 1985; Joseph & Thevaranjan, 1998; Misra, Coughlan, & Narasimhan, 2005). This literature studies the effect of uncertainty, risk aversion, and job design on sales force compensation and performance. Results from the literature suggest that the inefficiency of a sales contract increases with risk aversion and uncertainty (Joseph & Thevaranjan, 1998; Misra et al., 2005). The sales compensation literature also extends to the subject of comparison between different types of sales contracts. For example, Syam, Hess, and Yang (2013) study the efficacy of contests versus quota in the context of imbalanced territories and homogeneous sales force, and find that territorial imbalance hurts efficiency of contests more than quota. Similarly, Joseph and Thevaranjan (1998) study monitoring and linear incentives, and find that monitoring allows a firm to lower the amount of total compensation paid to a salesperson. Sales contests are another type of contract that have been studied in the literature (Kalra & Shi, 2001; Verbeke, Dietz, & Verwaal, 2011). For example, Kalra and Shi (2001) study the subject of optimal contest design and find that the total number of winners in a sales contest should not exceed half the number of participants. Our research problem also relates to the subject of sales compensation, and we also study the effect of risk aversion and uncertainty on the sales compensation measures. In doing so, we compare linear pay, contests, and monitoring-based contracts. However, we contribute to the sales compensation literature by studying compensation in the context of multi-channel attribution and associated team moral hazard problems.

In the context of multi-channel attribution and team moral hazard, the problem we investigate is similar to the problem of free riding in teams. The seminal paper in this area (Holmstrom, 1982) states that there does not exist a budget balanced contract that can achieve first-best efficiency. To solve this problem, Holmstrom (1982) suggests the use of group bonus contracts. However, such contracts may be difficult to implement in the contexts that we study, and they are rarely used to solve the problem in practice. According to Holmstrom (1982), a contract that assigns a bonus equivalent to the first-best outcome if the jointly first-best outcome is attained, but a zero bonus if the target is not met can solve the moral hazard in teams. However, such a contract has two Nash equilibriums: one in which the agents put their first-best effort and another in which they put zero effort. Experimental evidence confirms that group target bonus contracts underperform compared to other contracts (Nalbantian & Schotter, 1997). Subsequent literature in economics (Rasmusen, 1987) recommends complex contracts that may be difficult to implement in the current context. For example, Rasmusen (1987) requires a large penalty for a randomly chosen worker when output is low. Although Marino and Zabojnik's (2004) contract of internal competition between teams can fit some marketing-sales lead management contexts, it is difficult to implement in the personal selling contexts, as lead generation and lead closure involve multiple marketing agents and sales reps working independently. The problem of attribution and contract design in a multi-channel context has recently been studied in the online attribution literature (Berman, 2018; Li & Kannan, 2014). However, many retail and business products, for example, automobiles, financial services, industrial products, etc., cannot be bought over the internet or by phone and therefore, sales compensation design in such multi-channel contexts is important (Noble, Griffith, & Weinberger, 2005).

Empirical research in sales lead management (Chatterjee, 1994; Sabnis et al., 2013; Smith et al., 2006) suggests ways to improve lead coordination between marketing and sales, mostly through better sales processes and lead tracking techniques, rather than through contract design, and therefore our research is complementary to this stream of research.

3. Model

Our model includes three types of players: the firm, marketing agents, and sales reps. We describe the product market and the sales response functions, the characteristics of the marketing agents and the sales reps, their decisions, the decisions of firms in the product market, and the game sequence. Table 2 and 3 provide notation and support for the main assumptions of the model, respectively.

3.1. Product market and sales response functions

The risk-neutral firm operates in a market in which personal selling is required to generate revenue. Selling products in this market requires two distinct activities, lead generation and lead closure. Therefore, firms usually assign two distinct agents to carry out these two activities. The agent who carries out the activity of lead generation is called the marketing agent while the agent who carries out the activity of lead closure is called the sales rep. In the activity of lead generation, the marketing agent puts marketing effort in the form of prospecting and persuasion to identify potential customers and generate interest in them for the firm's products. Once such a potential customer is identified and influenced, the information about the customer, called the lead, is acquired by the firm and forwarded to the sales rep for sales closure. In the activity of lead closure the sales reps put selling effort in the form of persuasion for sales closure, and upselling and cross selling of related products at the time of sales closure. If the customer purchases the product the sale is closed. A unique feature of this product market is that it is often very difficult to separate the outcome of the two activities, and only a joint outcome in the form of final sales is observed. In other words, the intermediate outcome, or the value of the leads that the marketing agents generate, is not observable and verifiable, at least without incurring significant costs. This unique feature of the market creates the moral hazard problem[1]. Next, we describe the sales response functions in this market in terms of model parameters.

Suppose that for every N sales lead, the sales generated by the firm is denoted by $N\tilde{x}$, where $\tilde{x}$ is given as,

$$\tilde{x} \overset{def}{=} \phi(q) + (1-\phi)s + \tilde{\varepsilon}. \tag{1}$$

The variable q is the effort put in by the marketing agent to generate a lead, $\phi q + \tilde{\varepsilon}_1$ is the value of a lead to the firm, s is the effort put in sales conversion, and $\tilde{\varepsilon}$ is the total uncertainty associated with sales from the lead. The value of the lead, $\phi q + \tilde{\varepsilon}_1$, stochastically increases with the marketing agent's effort, q. The random factor in the value of the lead, or the uncertainty associated with lead generation, $\tilde{\varepsilon}_1$, captures the fact that in spite of the marketing agent's high (low) effort, the value of the lead need not be high (low). The total uncertainty is normally distributed such that $\tilde{\varepsilon} \sim N(0, \sigma^2)$, and it includes both lead generation and conversion uncertainty. The parameter $\phi \in [0,1]$ is the relative importance of the marketing effort to final sales, and it captures the fact that the marketing activity is more important in some product categories but less so in others. For example, for a standard product such as an airline ticket the marketing effort strongly affects final sales, whereas for a highly customizable and complex product such as life insurance, the sales effort likely has a larger role than the marketing effort[2]. Parameters of the model are common knowledge, as the firm, marketing agents, and sales reps all have sufficient experience in the market. To focus on the demand side of the problem, we assume the marginal cost of the product is 0. We normalize N to 1 for the sake of parsimony.

[1] While it can be difficult for a firm to evaluate the quality of a lead before sales conversion, in most cases leads can still be tracked back to content created by a marketing agent because in most companies a single web page related to content is developed by a single person. Generally, web analytics tools (e.g. Google Analytics) can be used to track back a lead to a single page (Slater, 2014).

[2] Note that our model is general. As ϕ goes from 0 to 1, we consider all potential cases, with 0 being situations where only personal selling is required to sell a product and 1 being situations where only marketing effort is required to sell the product. If we substitute $\phi = 1$ then our results will apply to the case of purely online services, though the focus of our research is on cases where ϕ is intermediate.

Table 2
Notation.

Notation	Description
Outcome variables	
x	The probability of conversion of a sales lead after the sales rep puts effort to close it.
π^z	Firm profit if z type of contract is used, where $z \in \{FBS, TI, LQ, A, C, EC\}$ and FBS = first-best solution, TI = team incentive (or revenue-based), LQ = lead qualification, A = autarky, C = context, EC = endogenous contest.
Decision variables	
b_q, b_s	Linear incentive (or commission rate) for marketing agent and sales rep, respectively.
w_q, w_s	Fixed salary for marketing agent and sales rep, respectively.
P_q, P_s	Prize amounts in contest for marketing agents and sales reps, respectively.
q	Effort put by a marketing agent in generating a sales lead.
s	Effort put by a sales rep in converting a sales lead
q_s	Effort put by the sales rep in generating a sales lead.
Parameters	
φ	Relative importance of marketing agent's role (lead generation) in generating a sale.
$\tilde{\varepsilon}, \sigma^2$	The term $\tilde{\varepsilon}$ is the random part of the sales lead quality and $\tilde{\varepsilon} \sim N(0, \sigma^2)$, where σ^2 is the measure of uncertainty in lead quality.
f	Cost of qualifying a sales lead.
$\tilde{\varepsilon}_Q, \sigma_Q^2$	The term $\tilde{\varepsilon}_Q$ is the random part of the qualified sales lead quality and $\tilde{\varepsilon}_Q \sim N(0, \sigma_Q^2)$, where σ_Q is the measurement error of lead quality measurement.
a	Cost coefficient of effort for sales reps in generating sales leads.
r	Constant absolute risk aversion coefficient of the marketing agents and the sales reps.

3.2. Marketing agent's and sales representative's decisions

The risk-averse marketing agent and the sales rep maximize their expected utility subject to their individual rationality constraints being met. In computing the marketing agent's expected utility, we consider the certainty equivalent form of the utility function (Milgrom & Roberts, 1992, pp. 246–247), that is,

$$E[u(w(\tilde{x}), q)] \stackrel{def}{=} E[w(\tilde{x})] - \frac{r}{2}Var[w(\tilde{x})] - c(q), \tag{2}$$

where $w(\tilde{x})$ is the income from effort, r is the constant absolute risk aversion (CARA) coefficient, $\frac{r}{2}Var[w(\tilde{x})]$ is the risk premium, and $c(q)$ is the cost of effort. Risk aversion is the preference for less risky gambles over more risky ones. A person with risk aversion is likely to invest less effort in the presence of uncertainty because there is no surety that the effort will lead to higher sales, although on average higher effort will lead to higher sales.

The cost of effort for the marketing agent is $c(q) \stackrel{def}{=} \frac{q^2}{2}$. Similarly, the expected utility function for sales reps is $E[u(w_s(\tilde{x}), s)] \stackrel{def}{=} E[w_s(\tilde{x})] - \frac{r}{2}Var[w_s(\tilde{x})] - c(s)$, where $w(\tilde{x})$ is the income from effort, and $c(s)$ is the cost of the effort. The cost of effort for the sales reps is $c(s) \stackrel{def}{=} c\frac{s^2}{2}$. We also assume that sales employees can generate leads, but it costs them $c(q_s) \stackrel{def}{=} a\frac{q_S^2}{2}$ to put effort towards lead generation, where $a > 1$. This cost of effort is additive, such that it costs the sales rep $c(q_s) + c(s)$ to generate sales of $\tilde{x} = \phi q_s + (1 - \phi)s + \tilde{\varepsilon}$. The parameter a captures the benefit of specialization for marketing agents, due to economies of scale and scope, when they generate leads, whereas sales reps do not have such advantages. This is also the reasons why firms may use marketing employees to generate sales leads in spite of attribution problems. For example, the competencies required in generating sales leads from internet are quite different from those required in converting the sales leads. The reservation utilities for marketing agents and sales employees are normalized to zero. We also assume that the firm can use lead qualification to obtain a noisy measure of the quality of leads produced by the marketing agents. However, this process is costly because someone has to call customers and ascertain their prospects for sales conversion before sales effort is made. The lead qualification process costs the firm f per sales lead, where f is a parameter that captures the cost incurred to validate the lead. The noisy measure of lead quality is $q + \tilde{\varepsilon}_1 + \tilde{\varepsilon}_q$, where $E[\tilde{\varepsilon}_q] = 0$ and $Var[\tilde{\varepsilon}_1 + \tilde{\varepsilon}_q] = \sigma_Q^2$. The parameter σ_Q is defined as the lead qualification error (or lead qualification uncertainty).

3.3. The firm, its decisions, and the game sequence

The firm chooses a contract to maximize its profit subject to the individual rationality and incentive compatibility constraints for the marketing agents and the sales reps. If z is the type of contract used by the firm, we denote the contract C_z. The type of contract, z, can be a team incentive or a revenue-based contract (in which case $z = Team$), an autarky contract ($z = A$), a lead qualification contract ($z = Q$), or a contest-based contract ($z = Contest$). We describe these contracts in detail in the analysis section. The firm's price is normalized to 1, and thus the profit margin is 1. Consistent with past literature, we only consider linear contracts for all non-contest-based contracts (Holmstrom & Milgrom, 1987; Joseph & Thevaranjan, 1998). The firm's objective function for each of the contracts is given in the analysis section. The game sequence for the model is described in Fig. 1.

4. Analysis and results

We first consider the benchmark first-best case and then three other commonly implemented linear contracts. After that, we consider contest-based contracts.

4.1. Benchmark first-best solution

Consistent with the literature in the area of sales compensation and contracts (Holmstrom, 1982; Misra et al., 2005), we first calculate the first-best benchmark results. The first-best benchmark analysis provides the results that would be possible if there were no attribution problem and each agent's contribution to sales could accurately be captured every time a sale was made. The linear contract provided to the employee is of the form $b\tilde{x} + w$, where b is the linear incentive, $\tilde{x}$ is the sales generated, and w is the fixed component. The first-best problem is given as follows:

$$\Pi^{FBS} = \max_{b,w} E[\pi] = E[\tilde{x} - b\tilde{x} - w] \text{ subject to} \tag{3}$$

$$(q^{FBS}, s^{FBS}) = \arg\max_{q,s} E[b\tilde{x} + w] - \frac{r}{2}Var[b(\tilde{x})] - c(q) - c(s) \quad (IC), \tag{4}$$

$$E[b\tilde{x} + w] - \frac{r}{2}Var[b(\tilde{x})] - c(q) - c(s) \geq 0. \quad (IR) \tag{5}$$

The first-best profit, $\Pi^{FBS} = \frac{(1 - 2(1 - \phi)\phi)^2}{2(1 + r\sigma^2 - 2(1 - \phi)\phi)}$, decreases with risk aversion, r, and the uncertainty associated with sales leads, σ, because

Table 3
Model assumptions and their support.

Model component	Main assumptions	Support for assumption
Sales response function	Linear additive functional form with normal errors	We use a linear effort response function with normal errors, as is standard in the literature (see Holmstrom & Milgrom, 1987; Lal & Srinivasan, 1993). Results from these standard linear models have been validated by empirical research in sales force (Misra et al., 2005 etc.).
	Unobservability of quality of marketing leads, but observability of final sales.	Sales leads are often in form of a phone number and some customer information like name etc., from which it is difficult to discern the final probability of purchase (i.e. the lead quality). It is also difficult to evaluate the quality of each sales lead because until the sales rep puts some effort to convert the prospective customer it is not known whether the customer will purchase the firm's product. If lead quality could be measured accurately without any cost, the problem of lead management would not arise in the first place. However, as per evidence cited in (see Gartner, 2002) it seems that there is lack of agreement on lead quality. Note that while we assume that lead quality is not observable costlessly, we do consider that it is possible to generate a more exact proxy measure of lead quality if the company invests in lead qualification. This is reasonable because it costs something to the firm to have a third party call on the customers and assess the level of interest in purchase of a product. However, in spite of that it may not be possible to get the exact quality of a lead.
	Modeling of relative importance of marketing agent's role (or lead generation) in final sales	Inside sales has varying importance in different product categories, types of market segments and geographies. For example, for a standard product like an airline ticket, the marketing effort strongly affects final sales, whereas for a highly customizable and complex product like life insurance, sales effort likely has a larger role than marketing effort. This variance in importance of inside sales has been covered by business literature (Zoltners, Sinha & Lorimer, 2013). Note, that if we make the relative importance half, for both marketing and sales to be equally important we are able to derive all the result and hence, our model assumption makes the model more general.
Sales reps	Functional form of utility Function and effort decision	We use the standard expected utility model for sales reps (see Joseph & Thevarajan, 1998 etc.). The model has been validated by empirical research in sales management (Misra et al., 2005). Sales reps only choose their effort towards sales lead conversion if they are converting leads. However, they choose their effort towards lead generation if the firm chooses a sales autarky contract. The cost of effort towards lead generation and lead conversion are independent for the sake of parsimony (a standard assumption in such a context, see Dong, Yao, & Cui, 2011).
	Cost coefficient for lead generation	Cost coefficient of lead generation is higher for sales reps than for marketing agents. The assumption captures the benefit of specialization for marketing agents, due to economies of scale and scope, when they generate leads, whereas sales reps do not have such advantages.
Marketing agents	Functional form of utility Function and effort decision	We use the standard expected utility model for sales reps (see Joseph & Thevarajan, 1998, etc.). The model has been validated by empirical research in sales management (Misra et al., 2005).
	Proxy measure of lead quality	We assume that the proxy measure of lead quality is a normally distributed unbiased measure but one that has measurement error. Further, the measurement error is lower than the uncertainty in sales lead quality. Since, it is a self-report measure, a measurement error is expected. Moreover, if there were no measurement error then the whole problem of sales lead moral hazard would not arise in the first place. Another problem, with accuracy in sales lead quality is that while lead qualification measures are often checklists for minimum criteria that a lead needs to cross, ascertaining the upside potential of a lead is much more difficult.
	Cost of lead qualification	To qualify a lead a person has to call the customer and complete a checklist; this process is costly, particularly, for lower value products like credit card etc.
Firm	Exogeneity of profit margin	We assume profit margin as exogenous and normalize it to 1. Exogeneity of profit margin is a standard assumption (see Basu et al., 1985) that has been validated by empirical research in sales force (e.g., Misra et al., 2005). Making the profit margin endogenous does not change the results qualitatively.
	Decision variables: contract types (first-best, linear contract, contest), salary, commissions and prizes (contest)	We restrict our analysis to sales contracts that are often used by firms in the context of lead management. For example, in Table WA B1 and B3 real life examples of application of each type of contract have been given. We do this because other complex types of contracts developed in economics literature that may solve the team moral hazard problem may not be implementable in the institutional context of sales lead management. For example, Rasmusen (1987) requires a large penalty for a randomly chosen worker when output is low, and Legros & Matsushima (1991) require randomization of effort by agents. Moreover, linear contracts have been shown to approximate non-linear contracts in the long run (Holmstrom & Milgrom, 1987).
Strategic interaction	Order of decisions	As standard in principal agent models of sales force management, we assume that the firm decides on the sales compensation after which sales reps and marketing agents decide whether to accept the contract and how much effort to put in. Marketing agents and sales rep make the decisions simultaneously, because neither group has a super information set. Moreover, changing the order to sequential is unlikely to change the qualitative results.

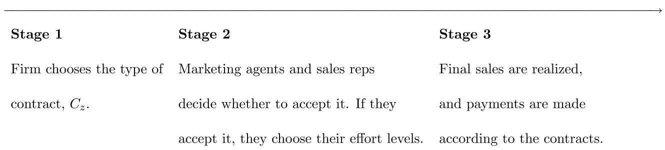


Fig. 1. Game sequence.

risk aversion and uncertainty increase the risk premium required to employ the employee, and a higher risk premium decreases the extent of the incentive that the firm provides to the employee, leading to lower effort, sales, and profit. Furthermore, the profit has an u-shaped relationship with the importance of marketing, ϕ, because at high and low levels the benefits from specialization and economies of scale increase. Now, we consider a team incentive contract.

4.2. Revenue-based (or team incentive) contract

This section investigates the situation when marketing agents and sales reps receive incentives based on final sales generated. The compensation paid to the marketing agent is given as $b_q\tilde{x} + w_q$ while the compensation paid to the sales rep is given as $b_s\tilde{x} + w_s$, where b_q and b_s denote the linear incentive and w_q and w_s denote the fixed salaries for each of the employees. The firm's problem in this case is given as,

$$\Pi^{TI} = \max_{b_q, b_s, w_q, w_s} E[\pi] = E[\tilde{x} - b_q\tilde{x} - w_q - b_s\tilde{x} - w_s] \text{ subject to} \tag{6}$$

$$q^{TI} = \arg\max_q E[b_q\tilde{x} + w_q] - \frac{r}{2}Var[b_q(\tilde{x})] - c(q) \quad (IC), \tag{7}$$

$$E[b_q\tilde{x} + w_q] - \frac{r}{2}Var[b(\tilde{x})] - c(q) \geq 0 \quad (IR), \tag{8}$$

$$s^{TI} = \arg\max_s E[b_s\tilde{x} + w_s] - \frac{r}{2}Var[b_s(\tilde{x})] - c(s) \quad (IC), \tag{9}$$

$$E[b_s\tilde{x} + w_s] - \frac{r}{2}Var[b_s(\tilde{x})] - c(s) \geq 0 \quad (IR), \tag{10}$$

$$1 \geq b_q + b_s \quad \text{(budget balance constraint).} \tag{11}$$

Solving the above problem, we get,

$$\Pi^{TI} = \begin{cases} \dfrac{(-r^2\sigma^4 + r\sigma^2(1 - 2(1-\phi)\phi) + (1 - (1-\phi)\phi)(1 - 3(1-\phi)\phi))}{2 + 4r\sigma^2 - 4\phi(1-\phi)}, & r < \dfrac{\phi(1-\phi)}{\sigma^2} \\ \dfrac{1}{2} - (1-\phi)\phi + \dfrac{r\sigma^2}{2}\left(-2 + r\sigma^2\left(\dfrac{1}{r\sigma^2 + (1-\phi)^2} + \dfrac{1}{r\sigma^2 + \phi^2}\right)\right), & r \geq \dfrac{\phi(1-\phi)}{\sigma^2} \end{cases}. \tag{12}$$

The profit decreases with risk aversion, r, and the uncertainty associated with sales leads, σ, and it has a u-shaped relationship with ϕ. However, the team incentive contract fails to achieve the first-best outcome. The difference between profits with a contract and the first-best profit that the firm can earn is defined as the inefficiency. The results are summarized as follows:

Proposition 1. *A comparison of the first-best and the team incentive contract shows that,*

1 *A team incentive contract never attains the first-best outcome, i.e.,* $\pi^{FBS} > \pi^{TI} \forall \phi, \sigma, r$.
2 *The inefficiency of the team incentive contract follows an inverted-u shaped relationship with respect to marketing's importance in the sales response function,* ϕ.
3 *The inefficiency of the team incentive contract follows an u-shaped relationship with risk aversion, r, and uncertainty,* σ, *when* $r \leqslant \frac{\phi(1-\phi)}{\sigma^2}$ *and an inverted-u relationship when* $r > \frac{\phi(1-\phi)}{\sigma^2}$.

Proof. See Appendix A. ■

The benchmark first-best sales is higher than the sales from the team incentive contract. This is expected because in a team incentive contract, the marketing agent and sales rep must share the value of the joint outcome of the lead generation and lead closure activities. This shared payment decreases their incentives because each agent tries to free ride on the share of effort put in by the other agent. For example, if the marketing agent knows that he or she will get only a b_q share of the sales $\tilde{x}$ generated through sales leads, he or she will not give effort for the $(1 - b_q)$ share of the sales, $\tilde{x}$, that will go to the sales rep. Nobody knows which b_q part of the share belongs to the marketing agent and which $(1 - b_q)$ part of the sales belongs to the sales rep, however, so free riding occurs, without any penalty.

Holmstrom (1982) shows that as long as the contract involves the division of commission payment between two agents, a contract characteristic that is called budget balanced, there can be no contract that results in the first-best solution. More generally, in the current context, budget balance means that the total expenditure on the generation and closure of leads needs to be less than or equal to the profit generated from the leads. A contract that is not budget balanced would be undesirable and is rarely observed, yet a budget-balanced contract is inefficient in solving the lead management problem (Fig. 2).

The inefficiency of the team incentive contract is higher for moderate values of ϕ because when both marketing and sales play equally important roles in generating final sales, there is more propensity to free ride for each of the agents. The inefficiency of the team incentive contract has an u-shaped relationship when risk aversion is below the threshold and an inverted-u shaped relationship with risk aversion when risk aversion is beyond a threshold. The non-monotonic relationship between the inefficiency of a revenue-based contract and risk aversion complements the existing literature, which has primarily found that inefficiency increases monotonically with risk aversion (Joseph & Thevaranjan, 1998; Misra et al., 2005).

4.3. Lead qualification contract

In the case of a lead qualification contract, the firm uses a proxy measure of lead quality to compensate the marketing agent and pays the sales rep on the basis of final sales converted minus the expected value of the leads. The proxy measure of the lead quality is given by $q + \varepsilon_1 + \varepsilon_q$, where ε_q is the measurement error, and c is the cost of lead qualification. The firm compensates the marketing agent according to the linear incentive $b_q(q + \varepsilon_1 + \varepsilon_q) + w_q$, where b_q is the linear incentive and w_q is the fixed salary for the marketing agent. The sales rep is paid $b_s(s + \varepsilon) + w_s$, where b_s is the linear incentive and w_s is the fixed salary. The firm's problem in the case of a lead qualification contract is given as

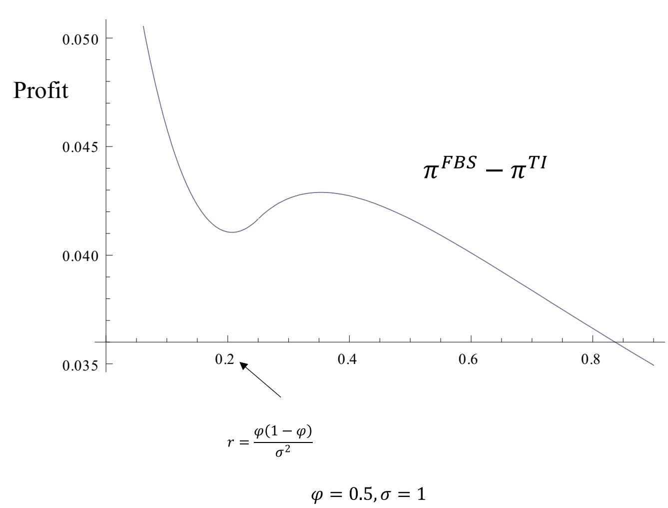


Fig. 2. Inefficiency of revenue based contract plotted with respect to risk aversion.

follows:

$$\Pi^Q = \max_{b_q, b_s, w_q, w_s} E[\pi] = E[\tilde{x} - b_q(q + \varepsilon_1 + \varepsilon_q) - w_q - b_s(s + \varepsilon) - w_s - f], \tag{13}$$

subject to

$$q^Q = \arg\max_q E[b_q(q + \varepsilon_1 + \varepsilon_q) + w_q] - \frac{r}{2}[Var[b_q(\varepsilon_1 + \varepsilon_q)] - c(q) \quad (IC), \tag{14}$$

$$E[b_q(q + \varepsilon_1 + \varepsilon_q) + w_q] - \frac{r}{2}Var[b_q(\varepsilon_1 + \varepsilon_q)] - c(q) \geq 0 \quad (IR), \tag{15}$$

$$s^Q = \arg\max_s E[b_s(s + \varepsilon) + w_s] - \frac{r}{2}Var[b_s(\varepsilon)] - c(s) \quad (IC), \tag{16}$$

$$E[b_s(s + \varepsilon) + w_s] - \frac{r}{2}Var[b_s(\varepsilon)] - c(s) \geq 0 \quad (IR). \tag{17}$$

The lead qualification profit, $\Pi^Q = \frac{1}{2}\left(\frac{(1 - 2(1 - \phi)\phi + r(\sigma_Q^2(1 - \phi)^2 + \sigma^2\phi^2))}{(1 + r\sigma^2)(1 + r\sigma_Q^2)} - 2f\right)$, declines with risk aversion, r, uncertainty, σ, cost of lead qualification, f, and lead qualification error, σ_Q. The profit has a u-shaped relationship with the importance of the marketing agent, ϕ.

When we analyze the profit from the autarky contract[3] we find that $\Pi^A = \frac{(a(-1 + \phi)^2 + \phi^2)^2}{2a(a(r\sigma^2 + (-1 + \phi)^2) + \phi^2)}$. The comparative statics for the autarky contracts are similar to those of the first-best solution. However, the inefficiency due to the lack of specialization in marketing activity decreases final sales, and this effect is greater if the marketing activity is more important for the final sales generated. A comparison of the sales generated from each of the contract types discussed above is given as follows:

Proposition 2. *A comparison of the profit from the four contracts shows that,*

1. *Team incentive and autarky contracts do not achieve the first-best results, i.e.,* $\Pi^{FBS} > \{\Pi^A, \Pi^{TI}\} \ \forall \ \phi, r, \sigma, a$.
2. *The lead qualification contract does not achieve the first-best result if risk aversion and uncertainty are low, and the importance of marketing and cost of lead qualification are high. However, if the cost and error variances associated with lead qualification are low, then lead qualification solves the sales lead moral hazard problem.*

Proof. See Appendix A. ■

The benchmark first-best profit is greater than the profit from a team incentive contract because team incentive does not break the budget. With a budget balance, the incentives for marketing agents and sales reps diminish because they get to earn only a partial share of the total output that they generate, and they free ride on the other agent's effort. The sales autarky contract fails to achieve first-best outcomes because of the ineffectiveness of the sales rep in conducting marketing. The lead qualification contract is inefficient relative to the first-best when the cost of lead qualification is high or risk aversion and uncertainty are lower. However, if the risk aversion and uncertainty of sales conversion are high, the lead qualification contract can become more efficient than the first-best because while the first-best does not suffer from team moral hazard, it still suffers from risk aversion and uncertainty. As risk aversion and uncertainty increase, the first-best contract has to compensate the employee for taking the overall sales risk with respect to both lead generation and lead closure efforts. However, in the case of a lead qualification contract, since the marketing agent is paid on the basis of a proxy measure of lead quality whose uncertainty is lower than the overall risk associated with sales, the marketing agent needs to be paid lower risk premium. A lower risk premium for the marketing agent allows the firm to induce more effort from the agent than that of the first-best. If risk aversion and uncertainty are considerably high then this effect becomes strong, and it makes the lead qualification contract superior to the first-best. This in part may explain the popularity of lead qualification. For example, it is reported that 50% of leads go through some form of qualification (Gleanster, 2010). Sales autarky is superior to team incentives when the importance of the sales effort to final sales is greater and sales reps are not too ineffective in conducting marketing. These results may explain the lead management problems highlighted in business press and empirical research, as we described in the introduction.

In the next proposition, we study the firm's choice of contracts as a function of risk aversion and uncertainty. We assume the budget balance constraint to be non-binding, that is, $r > \frac{\phi(1 - \phi)}{\sigma^2}$, when we consider the team incentive contract. The case when the budget balance constraint is binding leads to a larger number of conditions, although the qualitative results remain the same.

Proposition 3. *Comparison of the team incentive, lead qualification, and autarky contracts shows that,*

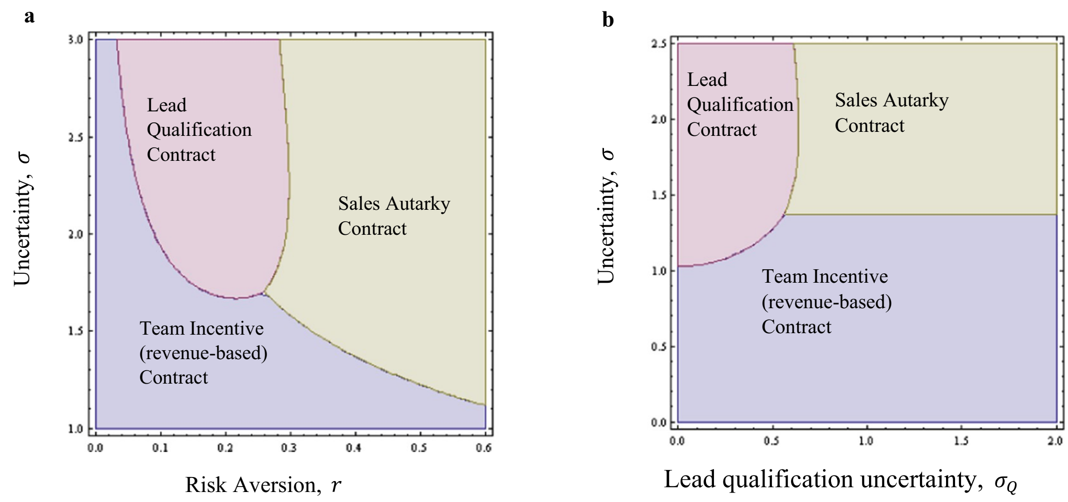
1. *The team incentive contract is more profitable than the lead qualification contract if lead qualification error variance and costs are higher or if uncertainty and risk aversion are low.*
2. *The autarky contract is more profitable than the lead qualification contract if lead qualification error variance and costs are higher or if sales reps are sufficiently capable of performing the marketing activity of lead generation.*
3. *The profit from the team incentive contract is higher than that of an autarky contract if the importance of marketing in generating sales is sufficiently high and if the sales reps are sufficiently less capable of performing the marketing activity of lead generation. The team incentive contract is more profitable than the autarky contract if risk aversion or uncertainty are low.*

Proof. See Appendix A. ■

When risk aversion and sales uncertainty are low, team incentive contracts are more suitable, whereas when sales conversion uncertainty and risk aversion are higher, the lead qualification contracts may be more suitable. Team incentive contracts are also more profitable than autarky contracts when risk aversion and uncertainty are low. However, as uncertainty increases, lead qualification contracts become more profitable than autarky contracts when risk aversion is moderate. On the other hand, if qualified lead uncertainty increases, then autarky contracts are more profitable than lead qualification contracts. The results can be seen in Fig. 3a and b.

When risk aversion is low, the firm tends to prefer team incentive contracts over lead qualification and autarky contracts. As risk aversion increases, the team incentive contract loses its effectiveness compared to the autarky contract because of two reasons. First, as the team incentive contract involves two employees, the firm needs to compensate both of them for the same risk related to the final revenue. Hence, an increase in risk aversion increases the risk premium faster in the case of team incentive contracts as compared to autarky contracts. Second, since the team incentive contract suffers from a moral hazard problem, the effectiveness of incentives in such a contract is lower compared to that in autarky contracts. An increase in risk aversion leads the firm to reduce incentives faster in the case of team incentive contracts as compared to autarky contracts because the incentives are less effective in the case of a team. Therefore, an increase in risk aversion leads the firm to prefer autarky contracts over team incentives. As an increase in risk aversion also leads to an increase in risk premium for two employees in the case of lead qualification, the firm also prefers autarky contracts over lead qualification contracts. However, as uncertainty in the sales process increases, the firm finds it more profitable to use a lead qualification contract as compared to an autarky, or a team incentive contract. This is because the increase in sales uncertainty can be partially avoided if the firm can get a relatively precise measure of the lead quality and compensate the marketing agent based on that measure. These intuitions can be seen in Fig. 3a and b representing the strategy

[3] The problem formulation for the autarky case is available in Appendix A.



$\varphi = 0.5, a = 2, f = 0.1\ \sigma_Q = 1.2$ $\varphi = 0.5, a = 2, f = 0.1, r = 0.2$

Fig. 3. Strategy regions.

regions for the firm. The managerial implications of the above findings are discussed in Section 5.2.

In the following subsection, we discuss a contract that solves the lead management problem and at the same time preserves some of the desirable characteristics of the above-mentioned types of contracts that are often used by firms in such problem contexts.

4.4. Contests-based contracts

In deriving a contract that is more efficient than the contracts analyzed above as well as more implementable than those in Holmstrom (1982), we capture institutional details specific to lead management and focus on the types of contracts that are already being used. We first consider a contest where the firm pre-commits to prize amounts and then a type of contest where the prize amounts are endogeneously determined. For an example of such a contest-based contract for sales lead generation, refer to Table 3. Stack ranking-based pay is also used in retailing (Gott, 2017).

Suppose that the contest is run for a sales force composed of two marketing agents and two sales reps. We only consider two employees in the contests to keep parsimony. In addition, assume that the firm randomly allocates the sales leads to the sales reps. The efforts by the two marketing agents are denoted by q_1 and q_2, and the efforts by the two sales reps are denoted by s_1 and s_2. Therefore, the net revenue generated by the marketing agent 1 is given as $\left(\phi q_1 + (1-\phi)\frac{s_1+s_2}{2}\right)$, and the net revenue generated by the sales rep 1 is given as $\left((1-\phi)s_1 + \phi\left(\frac{q_1+q_2}{2}\right)\right)$. The prize structure offered by the firm is such that the winner of the contest between the two marketing agents gets P_q and the winner of the contest between the two sales reps gets P_s. The problem for the firm is given as follows:

$$\Pi^C = \max_{P_q, P_s} E[\pi] = \phi(q_1 + q_2) + (1-\phi)(s_1 + s_2) - P_q - P_s, \tag{18}$$

$$q_i^* = \arg\max_{q_i} \Pr(\phi(q_i - q_j) + \zeta > 0)u(P_q) - \frac{q_i^2}{2}, \tag{19}$$

$$\Pr(\phi(q_i - q_j) + \zeta > 0)u(P_q) - \frac{q_i^2}{2} \geqslant 0, \tag{20}$$

$$s_i^* = \arg\max_{s_i} \Pr((1-\phi)(s_i - s_j) + \zeta > 0)u(P_s) - \frac{s_i^2}{2}, \tag{21}$$

$$\Pr((1-\phi)(s_i - s_j) + \zeta > 0)u(P_s) - \frac{s_i^2}{2} \geqslant 0, \tag{22}$$

where $\zeta = \varepsilon_1 - \varepsilon_2 \sim N(0, 2\sigma^2)$, $i = \{1, 2\}$ and $i \neq j$.

Solving the above problem in case of risk neutrality[4], we find that $\Pi^C = \frac{1}{2}\left(\frac{2g(0)\phi^2 - 1}{\phi^2 g(0)^2} + \frac{2g(0)(1-\phi)^2 - 1}{(1-\phi)^2 g(0)^2}\right)$. This leads us to our next proposition.

Proposition 4. *In the case of risk-neutral employees, the contest-based contract attains first-best profits if* $\sigma = \frac{1}{8\sqrt{2\pi}}$ *. The profit from the contest-based contract follows an inverted-u shaped relationship with uncertainty, σ, such that* $\frac{\partial \Pi^C}{\partial \sigma} = 4\left(\sqrt{2\pi} - \pi\sigma\left(\frac{2}{(-1+\phi)^2} + \frac{2}{\phi^2}\right)\right) > 0$ *if* $\sigma < \frac{1}{8\sqrt{2\pi}}$.

Proof. See Appendix A. ■

The contest-based contract solves the lead management problem and attains the first-best results when the uncertainty and the importance of the marketing agent are moderate. The rationale is as follows. The marketing agents break each other's budgets and ensure higher incentives, as the winner of the contest among the marketing agents gets a prize created from the effort put in by both marketing agents. The random distribution of sales leads also ensures that the effort given by the sales reps to close each sales lead is common to the sales generated by any of the marketing agents, and this common effort is eliminated when the marketing agents are compared relative to one another rather than to a pre-specified group sales target, as suggested by Holmstrom (1982).

We illustrate the use of this contract with an example. Suppose that marketing and sales are equally important in the product category, $\phi = \frac{1}{2}$. A car dealership has two similar marketing agents, who send leads from their webpages, and two similar sales reps. Further, the dealership runs a contest for the agents and the reps. If uncertainty is moderate, these contracts declared by the dealership will lead to an efficient solution because they ensure two things. First, they ensure that

[4] With risk-averse marketing agents and sales reps, we are unable to derive closed form solutions due to the complexity of profit expressions. However, numerical simulations demonstrate that the qualitative results are similar to the risk-neutral case. The analysis is provided in Appendix A.

the dealership can clearly identify the outcome of the effort by each of the marketing agents and sales reps, as the leads generated from a marketing agent are randomly allocated between the sales reps. This randomization means that a marketing agent cannot blame the lack of sales on less effort by the sales rep because the other marketing agent faces the exact same conditions. Therefore, a payment based on a contest between the marketing agents ensures that each marketing agent puts in higher effort to increase his or her probability of winning the contest. For example, in the expression for the increased probability of winning due to a marginal effort by agent 1, $\frac{\partial \Pr(x_1 - x_2 > 0)}{\partial q_1}$, we find that the effort by the sales reps gets cancelled out and the increase in the probability of winning is only a function of the effort put in by marketing agents. Specifically, $\frac{\partial \Pr(x_1 - x_2 > 0)}{\partial q_1} = \frac{\partial \Pr\left(\frac{1}{2}(q_1+\varepsilon_1)+\frac{1}{2}\left(\frac{1}{2}(s_1+s_2)\right)-\left(\frac{1}{2}(q_2+\varepsilon_2)+\frac{1}{2}\left(\frac{1}{2}(s_1+s_2)\right)\right)>0\right)}{\partial q_1} = g(0) = \frac{1}{2\sigma\sqrt{2\pi}}$. The effort by the marketing agent increases with the marginal probability of winning the prize due to effort, that is $g(0) = \frac{1}{2\sigma\sqrt{2\pi}}$. The marginal probability increases with a decrease in uncertainty because that reduces the randomness of the contest and increases competition. However, decrease in uncertainty tightens the participation constraint, and beyond a point this tightening effect decreases the profit from the contest. This causes the inverted u-shaped relationship between the profit and uncertainty. The positive and negative parts of the equation $\frac{\partial \Pi^C}{\partial \sigma} = 4\left(\sqrt{2\pi} - \pi\sigma\left(\frac{2}{(-1+\phi)^2} + \frac{2}{\phi^2}\right)\right)$ capture the opposing effects. Similar arguments apply to the contract faced by the sales reps. Second, at an individual level, a marketing agent has the potential to earn the full value of the leads generated, similar to the case of the first-best solution, due to the potential of being paid twice as much in return for marginally higher effort. For example, the expected payment is $\left(\frac{E[x_1+x_2]}{2}\right)\Pr(x_1 - x_2 > 0)$, whereas in a team incentive contract, the payment would have been $\frac{x_1}{2}$. If the marginal increase in the probability of winning the prize from a marginally higher effort, that is $\frac{\partial \Pr(x_1 - x_2 > 0)}{\partial q_1}$, increases, the contest is much more motivating than the team incentive contract. More managerial implications of the research can be found in the Section 5.2. For example, a stack ranking-based pay similar to the one described above was used in the National Mutual Fund case in Cron and DeCarlo (2009). In the web appendix, we also provide analysis for the case of an endogeneous sales contest in which the prize amount is determined within the contest and the firm only commits to a rule for division of the sum. In such a case, the contest is budget balanced and we find that it is efficient at moderate levels of uncertainty.

5. Conclusions and managerial implications

The academic contribution, managerial implications, and limitations and future research scope for the research are given in the following subsections.

5.1. Academic contribution

We study the moral hazard arising from the multi-attribution problems that firms face when marketing agents source leads and sales reps convert them into sales. These problems arise because the quality of the intermediate product between the marketing agent and sales rep, the sales leads, is unobservable to the firms and this causes the employees to free ride. We study how compensation and contest-based contracts can be used to solve this problem. To the best of our knowledge, this is the first paper to consider the interaction of sales compensation and contests (Basu et al., 1985; Joseph & Thevaranjan, 1998; Kalra & Shi, 2001), sales lead management (Chatterjee, 1994; Sabnis et al., 2013; Smith et al., 2006), and multi-channel attribution (Holmstrom, 1982; Berman, 2018; Li & Kannan, 2014). We find that contracts based on team incentives, lead qualification, and autarky leave a gap between the first-best and the achieved solution due to budget balance, costs of lead qualification, and the sales force's lack of specialization in marketing, respectively. An increase in risk aversion favors autarky and lead qualification contracts over the team incentive contracts while an increase in overall sales uncertainty favors the lead qualification contract over an autarky and team incentive contract. We also find that there is a non-monotonic relationship between the inefficiency of a revenue-based contract and risk aversion, with inefficiency being the difference between profit from first-best and profit from the revenue-based contract. This result complements the existing literature which has primarily found that inefficiency increases monotonically with risk aversion (Joseph & Thevaranjan, 1998; Misra et al., 2005). We identify a certain type of contest that solves the moral hazard problems and achieves the first-best results, even when employees are risk neutral. The contest involves randomly distributing the sales leads to sales reps and comparing the marketing agents and sales reps to each other in the contest. The contest achieves efficiency when uncertainty is within a certain range. Such a contest can also be made budget balanced if the firm does not commit to a certain amount of prize money but just to a rule for division of the total profit generated from sales effort. These results contribute to the literature on the comparison between sales contests and linear sales performance pay (Gaba & Kalra, 1999; Syam et al., 2013) and asymmetry in contests (e.g., Lazear & Rosen, 1981; Kalra & Shi, 2001; Ridlon & Shin, 2013). The positioning of the paper with respect to the literature is also given Table 1.

5.2. Managerial implications

The managerial implications of the research are given in Table Web Appendix (WA) B3. A direct implication of our research for business practice is that many of the popular incentive contracts are not efficient at resolving the attribution and moral hazard problems, and depending upon product and market contexts, specific types of contracts need to be used. For example, we find that a parallel contest for marketing and sales employees with random assignment of leads may solve the problem caused by attribution and moral hazard problems when uncertainty in sales response function is moderate to low. An example of such a context is the telemarketing context in the National Mutual Fund case which is featured in the commonly used Darlymple sales management book (Cron & DeCarlo, 2009, page 430). As discussed in Table WA B3, the stack ranking-based pay discussed in the case is similar to the contract that we find to be optimal in such contexts. It is worth noting that such contest-based structures are being used by 20% of large firms to incentivize inside sales reps who are typically involved in telemarketing (Z S Associates, 2014).

We also find that if employees are less risk averse and when uncertainty is low, revenue-based compensation contracts can be optimal. Towers Watson (2011) reports that telemarketing reps handling large-volume sales transactions with short selling cycles have 25% of their compensation tied to sales commission. Due to the law of large numbers, such high volume sales transactions are likely to involve lower uncertainty, and hence it seems that industry practice may be in line with the research findings.

We also find that when sales uncertainty is large and the uncertainty associated with lead qualification is limited, firms are better off using a lead qualification-based compensation. In industries where the deal size is large and there are fewer potential deals, i.e., where sales uncertainty is larger based on the law of large numbers, such contracts are likely. Business markets for high-technology products and services match this description and we find that many of the high-technology companies pay based on the number and quality of sales leads (Z S Associates, 2014).

Finally, we find that when lead qualification costs are higher and sales uncertainty is also high, sales reps self-generating and closing leads may be optimal. In the life insurance industry, for example, clients vary in size, and it is difficult to predict sales in advance because of low conversion rates and the product is often unsought. Thus, we find that it is common for sales reps to generate their own leads (Morelli, 2015).

5.3. Limitations and future research

This research studies the ceteris paribus effect of the attribution problem on optimal compensation design using an analytic model. In future research, analytic and empirical studies could consider other variables such as the experience of sales reps, their competencies, asymmetry in ability between marketing and sales employees, inexperience of sales reps in generating sales leads, and environmental dynamism (Bierly & Daly, 2007; Dess & Beard, 1984) to see their effect on optimal compensation design. Empirical and experimental research could also test for the efficacy of different types of sales compensation contracts under different conditions. Moreover, further analytic research could incorporate incomplete information and competition. The current research takes a compensation-based approach to solve the coordination issues that arise due to the attribution problem in a multichannel context. However, such coordination problems can be solved to a certain extent through communication and trust between managers and teams across marketing and sales functions. Such an approach would be complementary to the compensation-based approach studied in the current paper. Another complementary approach would be for the firm to gather some customer feedback regarding salespeople or web content. However, such feedback may not completely resolve the issues of moral hazard. For example, Markey (2011) discusses the problems associated with linking pay to customer feedback. In addition, the focus of this research is on purchase process till sales closure. In other words, we have assumed that there are two distinct compensation methods for sales closure and after-sales service. This can be so because often after-sales service is handled by a different set of employees (e.g., customer service) or the compensation is different after a sale is booked. For example, if an automobile is sold and the customer has an issue with the automobile, the customer may directly go to the customer service instead of the sales personnel who sold the car. However, future research can consider situations where the sales incentives are tied to long-term relationships with the customers. Also, the focus of the current research is not on attribution problems for product categories like books sold on e-commerce sites such as Amazon, in which case sales conversion also takes place online. Future research can explore the problem of attribution and compensation in such contexts. In the current research, we consider asymmetry in ability of employees in an extension. However, our research is silent on the cause of such asymmetry. For example, the experience and age of marketing agents may lead to such asymmetry. Past research suggests that work experience is expected to have a positive effect on performance, whereas employee age is expected to have a negative effect (Fu, 2009). However, we leave the subject of empirical study of the effect of age and experience on sales lead generation and closure for future research. Future research may also consider the employee satisfaction effects of the different types of contracts studied in the current paper. Further, contracts like sales contests may only be effective for a limited period of time while others revenue-based incentives may work for a longer time period. Further, research may be needed to consider such factors in sales compensation design.

Acknowledgements

We would like to thank the editor, associate editor and anonymous reviewers for suggestions that helped improve the paper. We would also like to thank the participants at the European Marketing Academy, Product and Operations Management and Marketing Science Conferences for comments on the paper.

Appendix A. Technical appendix

For most of the proposition, only the problem definition, the sketch of the solution and the solution are provided. Detailed steps involved in the proof are available in the Web Appendix C.

Proof. Proposition 1. ∎

We first consider the benchmark first-best case and then the team incentive (revenue-based) contract.

A.1. Benchmark first-best solution

The linear contract provided to the employee is of the form $b\tilde{x} + w$, where b is the linear incentive, $\tilde{x}$ is the sales generated and w is the fixed component. The first-best problem is given as follows:

$$\Pi^{FBS} = \max_{b,w} E[\pi] = E[\tilde{x} - (b\tilde{x} + w)] \text{ subject to} \tag{23}$$

$$(q^{FBS}, s^{FBS}) = \arg\max_{q,s} E[b\tilde{x} + w] - \frac{r}{2}b^2\sigma^2 - \frac{q^2}{2} - \frac{s^2}{2} \quad (IC) \tag{24}$$

$$E[b\tilde{x} + w] - \frac{r}{2}b^2\sigma^2 - \frac{q^2}{2} - \frac{s^2}{2} \geq 0. \quad (IR) \tag{25}$$

First, we solve the IC constraint. The solution is substituted in the IR constraint and it is treated as binding. Solving the problem with IR constraint as binding, we find, $b^* = \frac{(1-2(1-\phi)\phi)}{1+r\sigma^2-2(1-\phi)\phi}$, and, $\Pi^{FBS} = \frac{(1-2(1-\phi)\phi)^2}{2(1+r\sigma^2-2(1-\phi)\phi)}$. It can be shown that, $\frac{\partial\Pi^{FBS}}{\partial r} < 0$, $\frac{\partial\Pi^{FBS}}{\partial\phi} < 0$ if $\phi \in \left(\frac{1}{2}, 1\right]$ and $\frac{\partial\Pi^{FBS}}{\partial\phi} > 0$ if $\phi \in \left[0, \frac{1}{2}\right)$. ∎

A.2. Team incentive (or revenue-based) contract

This subsection investigates the situation when marketing agents and sales reps receive incentives based on final sales generated. The compensation paid to the marketing agent is given as $b_q\tilde{x} + w_q$ while the compensation paid to the sales rep is given as $b_s\tilde{x} + w_s$, where b_q and b_s denote the linear incentive and w_q and w_s denote the fixed salaries for each of the employees. The firm's problem in this case is given as,

$$\Pi^{TI} = \max_{b_q,b_s,w_q,w_s} E[\pi] = E[\tilde{x} - b_q\tilde{x} - w_q - b_s\tilde{x} - w_s] \text{ subject to} \tag{26}$$

$$q^{TI} = \arg\max_{q} E[b_q\tilde{x} + w_q] - \frac{r}{2}b_q^2\sigma^2 - \frac{q^2}{2} \quad (IC), \tag{27}$$

$$E[b_q\tilde{x} + w_q] - \frac{r}{2}b_q^2\sigma^2 - \frac{q^2}{2} \geq 0 \quad (IR), \tag{28}$$

$$s^{TI} = \arg\max_{s} E[b_s\tilde{x} + w_s] - \frac{r}{2}b_s^2\sigma^2 - \frac{s^2}{2} \quad (IC), \tag{29}$$

$$E[b_s\tilde{x} + w_s] - \frac{r}{2}b_s^2\sigma^2 - \frac{s^2}{2} \geq 0 \quad (IR), \tag{30}$$

$$1 \geq b_q + b_s \quad \text{(budget balance constraint).} \tag{31}$$

First, the IC constraint is solved. Substituting the values in IR constraints and considering the IR constraint to be binding, we get, $E[b_q\tilde{x} + w_q] + E[b_s\tilde{x} + w_s] = \frac{b_1^2}{2}(r\sigma^2 + \phi^2) + \frac{b_2^2}{2}(r\sigma^2 + (1-\phi)^2)$. By substituting these in the firm's objective function, and then maximizing the profit with $1 \geq b_q + b_s$ as a constraint, the following solution was derived.

$$\Pi^{TI} = \begin{Bmatrix} \dfrac{(-r^2\sigma^4 + r\sigma^2(1-2(1-\phi)\phi) + (1-(1-\phi)\phi)(1-3(1-\phi)\phi))}{2 + 4r\sigma^2 - 4\phi(1-\phi)}, & r < \dfrac{\phi(1-\phi)}{\sigma^2} \\ \dfrac{1}{2} - (1-\phi)\phi + \dfrac{r\sigma^2}{2}\left(-2 + r\sigma^2\left(\dfrac{1}{r\sigma^2 + (1-\phi)^2} + \dfrac{1}{r\sigma^2 + \phi^2}\right)\right), & r \geq \dfrac{\phi(1-\phi)}{\sigma^2} \end{Bmatrix}$$

It can be shown that, $\frac{\partial \Pi^{TI}}{\partial r} < 0$, $\frac{\partial \Pi^{TI}}{\partial \phi} < 0$ if $\phi \in \left(\frac{1}{2}, 1\right]$ and $\frac{\partial \Pi^{TI}}{\partial \phi} > 0$ if $\phi \in \left[0, \frac{1}{2}\right)$. By comparing Π^{FBS} and Π^{TI}, we find:

(i) $\Pi^{FBS} > \Pi^{TI} \forall \phi, \sigma, r$; $\frac{\partial(\Pi^{FBS} - \Pi^{TI})}{\partial \phi} > 0 \ \forall \ \phi \in \left[0, \frac{1}{2}\right]$ and $\frac{\partial^2(\pi^{FBS} - \pi^{TI})}{\partial^2 \phi} < 0$;

(ii) $\frac{\partial(\Pi^{FBS} - \Pi^{TI})}{\partial r} < 0$ if $r < r^*$ and $\frac{\partial(\Pi^{FBS} - \Pi^{TI})}{\partial r} > 0$ if $r^* < r \leq \frac{\phi(1-\phi)}{2\sigma^2}$, where r^* is a root of $\Pi^{FBS} - \Pi^{TI} > 0$ when $r \leq \frac{\phi(1-\phi)}{\sigma^2}$; $\frac{\partial(\Pi^{FBS} - \Pi^{TI})}{\partial r} > 0$ if $\frac{\phi(1-\phi)}{\sigma^2} < r < r^{**}$ and $\frac{\partial(\Pi^{FBS} - \Pi^{TI})}{\partial r} < 0$ if $r^{**} < r$, where r^{**} is a root of $\Pi^{FBS} - \Pi^{TI} > 0$ when $r > \frac{\phi(1-\phi)}{\sigma^2}$. We find analogous results for σ.■

Proof. Proposition 2. ■

A.3. Lead qualification contract

$$\Pi^{Q} = \max_{b_q, b_s, w_q, w_s} E[\pi] = E[\tilde{x} - b_q(q + \varepsilon_1 + \varepsilon_q) - w_q - b_s(s + \varepsilon) - w_s - f] \tag{32}$$

subject to

$$q^{Q} = \arg\max_{q} E[b_q(q + \varepsilon_1 + \varepsilon_q) + w_q] - \frac{r}{2}b_q^2\sigma_Q^2 - \frac{q^2}{2} \quad (IC) \tag{33}$$

$$E[b_q(q + \varepsilon_1 + \varepsilon_q) + w_q] - \frac{r}{2}b_q^2\sigma_Q^2 - \frac{q^2}{2} \geq 0 \quad (IR) \tag{34}$$

$$s^{Q} = \arg\max_{s} E[b_s(s + \varepsilon) + w_s] - \frac{r}{2}b_s^2\sigma^2 - \frac{s^2}{2} \quad (IC) \tag{35}$$

$$E[b_s(s + \varepsilon) + w_s] - \frac{r}{2}b_s^2\sigma^2 - \frac{s^2}{2} \geq 0 \quad (IR). \tag{36}$$

$$\text{We find, } \Pi^{Q} = \frac{1}{2}\left(\frac{(1 - 2(1-\phi)\phi + r(\sigma_Q^2(1-\phi)^2 + \sigma^2\phi^2))}{(1 + r\sigma^2)(1 + r\sigma_Q^2)} - 2f\right). \tag{37}$$

It can be shown that, $\frac{\partial \Pi^{Q}}{\partial r} < 0$, $\frac{\partial \Pi^{Q}}{\partial \sigma} < 0$, $\frac{\partial \Pi^{Q}}{\partial f} < 0$, $\frac{\partial \Pi^{Q}}{\partial \sigma_Q} < 0$, $\frac{\partial \Pi^{Q}}{\partial \phi} < 0$ if $\phi \in \left(\frac{1}{2}, 1\right]$ and $\frac{\partial \Pi^{Q}}{\partial \phi} > 0$ if $\phi \in \left[0, \frac{1}{2}\right)$.

A.4. Independent sales rep contract (autarky)

$$\Pi^{A} = \max_{b,w} E[\pi] = E[\tilde{x} - b\tilde{x} - w] \text{ subject to} \tag{38}$$

$$(q^{A}, s^{A}) = \arg\max_{q_S, s} E[b\tilde{x} + w] - \frac{r}{2}Var[b(\tilde{x})] - c(q_s) - c(s) \quad (IC) \tag{39}$$

$$E[b\tilde{x} + w] - \frac{r}{2}Var[b(\tilde{x})] - c(q_s) - c(s) \geq 0. \quad (IR) \tag{40}$$

We find, $$\Pi^A = \frac{(a(-1+\phi)^2+\phi^2)^2}{2a(a(2r\sigma^2+(-1+\phi)^2)+\phi^2)}. \quad (41)$$

On comparison, we find that

(1.) $\Pi^{FBS} > \{\Pi^{TI}, \Pi^{A}\}\ \forall\ \phi, \sigma, r, a > 1$.

(2.) $\Pi^{FBS} > \Pi^{Q}$ if $0 \le f < f_1$, $0 < \sigma < \sigma_Q$, $\frac{2\sigma^2}{\sigma^2+\sigma_Q^2} < \phi < \phi_1$ and $0 < r < \frac{-2\sigma^2+5\sigma^2\phi+\sigma_Q^2\phi-6\sigma^2\phi^2-2\sigma_Q^2\phi^2+2\sigma^2\phi^3+2\sigma_Q^2\phi^3}{2\sigma^2\sigma_Q^2+\sigma^4\phi-7\sigma^2\sigma_Q^2\phi+8\sigma^2\sigma_Q^2\phi^2-4\sigma^2\sigma_Q^2\phi^3}$, or $0 < \sigma < \sigma_Q, \phi_1 < \phi < 1$ and $0 < r$, where ϕ_1 is a root of $2\sigma^2\sigma_Q^2+\sigma^4\phi-7\sigma^2\sigma_Q^2\phi+8\sigma^2\sigma_Q^2\phi^2-4\sigma^2\sigma_Q^2\phi^3 = 0$ and $f_1 = \Pi^Q - \Pi^{FBS}$. ■

Proof. Proposition 3. ▪

(1.) $\Pi^{TI} > \Pi^{Q}$ if $0 < f \le \bar{\Pi}^Q - \Pi^{TI}$ and (i) or (ii) hold, where (i) $0 < \phi < \phi_2$, $0 < r < r_1$ and, $\underline{\sigma}_Q < \sigma_Q$,(ii) $\phi_2 < \phi$, $0 < r$ and $\underline{\sigma}_Q < \sigma_Q$, where r_1 and $\underline{\sigma}_Q$ are roots of $\Pi^Q - \Pi^{TI} = 0$, and ϕ_2 is a root of $-2+5\phi-4\phi^2+2\phi^3 = 0$ or if $f \geqslant \bar{\Pi}^Q - \Pi^{TI}$, where $\bar{\Pi}^Q = \frac{1}{2}\left(\frac{(1-2(1-\phi)\phi+r(\sigma_Q^2(1-\phi)^2+\sigma^2\phi^2))}{(1+r\sigma^2)(1+r\sigma_Q^2)}\right)$.

(2.) $\Pi^{A} > \Pi^{Q}$ if $0 < f \le \bar{\Pi}^Q - \Pi^{TI}$, and any one of (i), (ii) or (iii) hold, where (i) $0 < \phi \le \frac{1}{2}$, $0 < r < r_2$ and $\underline{\sigma}_Q < \sigma_Q$,(ii) $1 < a \le \frac{\phi}{1-\phi}$, $0 < r$ and $\underline{\sigma}_Q < \sigma_Q$, (iii) $\frac{\phi}{1-\phi} \le a$, $0 < r < r_2$ and $\underline{\sigma}_Q < \sigma_Q$, where, r_2 and $\underline{\sigma}_Q$ are roots of $\Pi^Q - \Pi^{TI} = 0$ or if $f \geqslant \bar{\Pi}^Q - \Pi^{A}$.

(3.) $\Pi^{TI} > \Pi^{A}$ if $1 < a < \frac{1-2\phi+\phi^2}{\phi^2} + \sqrt{\frac{1-4\phi+6\phi^2-4\phi^3+2\phi^4}{\phi^4}}$ and $0 < r < r_3$, or $a \ge \frac{1-2\phi+\phi^2}{\phi^2} + \sqrt{\frac{1-4\phi+6\phi^2-4\phi^3+2\phi^4}{\phi^4}}$, where r_3 is a root of $\Pi^{TI} - \Pi^{A} = 0$. ■

Proof. Proposition 4. ▪

The problem for the firm is given as follows:

$$\Pi^C = \frac{1}{2}(\max_{P_q,P_s} E[\pi] = \phi(q_1+q_2) + (1-\phi)(s_1+s_2) - P_q - P_s)$$

$$q_i^* = \arg\max_{q_i} \Pr(\phi(q_i-q_j)+\zeta>0)u(P_q) - \frac{q_i^2}{2}$$

$$\Pr(\phi(q_i-q_j)+\zeta>0)u(P_q) - \frac{q_i^2}{2} \geqslant 0$$

$$s_i^* = \arg\max_{s_i} \Pr((1-\phi)(s_i-s_j)+\zeta>0)u(P_s) - \frac{s_i^2}{2}$$

$$\Pr((1-\phi)(s_i-s_j)+\zeta>0)u(P_s) - \frac{s_i^2}{2} \geqslant 0$$

where $\zeta = \varepsilon_i - \varepsilon_j \sim N(0, 2\sigma^2)$, $i = \{1, 2\}$ and $i \ne j$.

First, we solve the incentive compatibility constraint for the marketing agents. Then we solve the individual rationality constraint, and get $1-\phi^2 g(0)^2 u(P_q^*) \geqslant 0$ and $1-(1-\phi)^2 g(0)^2 u(P_s^*) \ge 0$. Assuming the participation constraints to be binding, the profit from a pair of sales and marketing employees is, $\Pi^C = \frac{1}{2}\left(\frac{2g(0)\phi^2-1}{g(0)^2\phi^2} + \frac{2g(0)(1-\phi)^2-1}{g(0)^2(1-\phi)^2}\right)$ where, $g(0) = \frac{1}{2\sigma\sqrt{2\pi}}$ after adjusting for the fact that the contest has two marketing and sales employees. For $r = 0$, $\Pi^C = \Pi^{FBS}$if $\sigma = \frac{1}{8\sqrt{2\pi}}$and $\phi = \frac{1}{2}$, $\Pi^C < \Pi^{FBS}$ if $\sigma > \frac{1}{8\sqrt{2\pi}}$or $\sigma < \frac{1}{8\sqrt{2\pi}}$. In addition, $\frac{\partial \Pi^C}{\partial_\sigma} < 0$ if $\sigma > \frac{1}{8\sqrt{2\pi}}$and $\frac{\partial \Pi^C}{\partial_\sigma} > 0$ if $\sigma < \frac{1}{8\sqrt{2\pi}}$. ■

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jbusres.2019.06.016.

References

Basu, A. K., Lal, R., Srinivasan, V., & Staelin, R. (1985). Salesforce compensation plans: An agency theoretic perspective. *Marketing Science, 4*(4), 267–291.

Berman, R. (2018). Beyond the last touch: Attribution in online advertising. *Marketing Science, 37*(5), 771–792.

Bierly, P. E., & Daly, P. S. (2007). Alternative knowledge strategies, competitive environment, and organizational performance in small manufacturing firms. *Entrepreneurship: Theory and Practice, 31*(4), 493–516.

Borzo, J. (2006). End of the cold call? *The Wall Street Journal*. Retrieved from https://www.wsj.com/articles/SB114685479965445124.

Chatterjee, S. C. (1994). *Salesperson reaction to management lead generation programs: The paradox investigated.* Doctoral DissertationPhiladelphia: University of Pennsylvania.

Cron, W. L., & DeCarlo, T. E. (2009). *Dalrymple's sales management: Concepts and cases*.

Dess, G. G., & Beard, D. W. (1984). Dimensions of organizational task environments. *Administrative Science Quarterly, 29*(1), 52–73.

Dong, Y., Yao, Y., & Cui, T. H. (2011). When Acquisition Spoils Retention: Direct Selling vs. Delegation Under CRM. *Management Science, 57*(7), 1288–1299. https://doi.org/10.1287/mnsc.1110.1344.

Financial Post (2016). *Canadian retailers consider overhauling employee commissions after growth of online sales*. Financial Post. Retrieved July 26, 2017, from http://business.financialpost.com/news/retail-marketing/canadian-retailers-consider-overhauling-employee-commissions-after-growth-of-online-sales/wcm/5ca7124c-66b8-4f15-aeb6-96874082d2d3.

Fu, F. Q. (2009). Effects of salesperson experience, age, and goal setting on new product performance trajectory: A growth curve modeling approach. *The Journal of Marketing Theory and Practice, 17*(1), 7–20.

Gaba, A., & Kalra, A. (1999). Risk behavior in response to quotas and contests. *Marketing*

Science, 18(3), 417–434. https://doi.org/10.1287/mksc.18.3.417.
Gartner. (2002). *Re-engineering lead management.* Gartner Retrieved from https://www.gartner.com/doc/372950/reengineering-lead-management.
Gevelber, L. (2016). The car-buying process: One consumer's 900+ digital interactions. Retrieved from https://www.thinkwithgoogle.com/consumer-insights/consumer-car-buying-process-reveals-auto-marketing-opportunities/.
Gleanster (2010). Gleansight lead nurturing. Retrieved from http://images.msgapp.com/uploads/95603/LicensedGleansights_comp7564jvl493sa/Gleansight-Lead-Nurturing-Q42010-Licensed.pdf.
Gott, C. (2017). Retail industry sales compensation designs and use of store rankings. Retrieved December 13, 2017, from http://bettersalescomp.com/sales-compensation/retail-industry-sales-compensation-desig.
Hedges, N. (2014). Beat the odds: How to make great cold calls, Inc.com. (Retrieved December 13, 2017, from) Retrieved from https://www.inc.com/nick-hedges/beat-the-odds-how-to-make-great-cold-calls.html.
Holmstrom, B. (1982). Moral hazard in teams. *The Bell Journal of Economics, 13*(2), 324–340.
Holmstrom, B., & Milgrom, P. (1987). Aggregation and Linearity in the Provision of Intertemporal Incentives. *Econometrica, 55*(2), 303–328. https://doi.org/10.2307/1913238.
Interactive Advertising Bureau (2015). IAB internet advertising revenue report. Retrieved from https://www.iab.com/wp-content/uploads/2016/04/IAB-Internet-Advertising-Revenue-Report-FY-2015.pdf.
Joseph, K., & Thevaranjan, A. (1998). Monitoring and incentives in sales organizations: An agency-theoretic perspective. *Marketing Science, 17*(2), 107–123. https://doi.org/10.1287/mksc.17.2.107.
Joyce, L. (2018). Why the customer journey in banking will never be "digital only". Retrieved August 31, 2018, from https://thefinancialbrand.com/69504/customer-journey-banking-experience/.
Kalra, A., & Shi, M. (2001). Designing optimal sales contests: A theoretical perspective. *Marketing Science, 20*(2), 170–193. https://doi.org/10.1287/mksc.20.2.170.10193.
Karr, D. (2016). ROBO: How today's shoppers research online and buy offline | MarTech. Retrieved August 31, 2018, from https://martech.zone/robo-research-online-buy-offline/.
Kaushik, A. (2012). Multi-channel attribution: Definitions, models and a reality check. Retrieved July 26, 2017, from https://www.kaushik.net/avinash/multi-channel-attribution-definitions-models/.
Kolowich, L. (2013). *Design a sales contest that ACTUALLY works!.* InsightSquared Retrieved from http://www.insightsquared.com/2013/12/design-a-sales-contest-that-actually-works/ (Retrieved December 13, 2017).
Lal, R., & Srinivasan, V. (1993). Compensation Plans for Single- and Multi-Product Salesforces: An Application of the Holmstrom-Milgrom Model. *Management Science, 39*(7), 777–793. https://doi.org/10.1287/mnsc.39.7.777.
Lazear, E. P., & Rosen, S. (1981). Rank-order tournaments as optimum labor contracts. *The Journal of Political Economy, 89*(5), 841–864.
Levin, D. (2014). Dealerships aim to cut out the lead-generation middleman | Fortune.com. Retrieved from http://fortune.com/2014/08/07/autonation-cars-com/ (Retrieved July 26, 2017, from).
Legros, P., & Matsushima, H. (1991). Efficiency in Partnerships. *Journal of Economic Theory, 55*(2), 296–322.
Li, H. A., & Kannan, P. (2014). Attributing conversions in a multichannel online marketing environment: An empirical model and a field experiment. *Journal of Marketing Research, 51*(1), 40–56. https://doi.org/10.1509/jmr.13.0050.
Lilien, G. (2009). *Managing lead generation and lead follow up: Challenges and opportunities.* Houston: Paper presented at the Selling and Sales Management Conference; UH.
Mantrala, M. K., Albers, S., Caldieraro, F., Jensen, O., Joseph, K., Krafft, M., & Lodish, L. (2010). Sales force modeling: State of the field and research agenda. *Marketing Letters, 21*(3), 255–272. https://doi.org/10.1007/s11002-010-9111-4.
Marino, A. M., & Zabojnik, J. (2004). Internal competition for corporate resources and incentives in teams. *RAND Journal of Economics, 35*(4), 710–727.
Markey, R. (2011). The dangers of linking pay to customer feedback. Retrieved August 31, 2018, from https://hbr.org/2011/09/the-dangers-of-linking-pay-to.
Milgrom, P., & Roberts, J. (1992). *Economics, organization, and management.* Englewood Cliffs, NJ: Prentice Hall.
Misra, S., Coughlan, A. T., & Narasimhan, C. (2005). Salesforce compensation: An analytical and empirical examination of the agency theoretic approach. *Quantitative Marketing and Economics, 3*, 5–39.
Morelli, S. (2015). How agents are making it big on the internet - InsuranceNewsNet. Retrieved December 13, 2017, from https://insurancenewsnet.com/innarticle/how-agents-are-making-it-big-on-the-internet#.WjH-alVKvIU.
Morgan, I. (2012). Making the web work for you. Retrieved from http://thesamewavelength.com/ian-morgan-google-uk-on-making-the-web-work-for-you/.
Murton, B. L., & Handley, A. (2018). B2B content marketing: 2018 benchmarks, budgets, and trends – North America. *Content Marketing Institute*. https://contentmarketinginstitute.com/wp-content/uploads/2017/12/2018_B2C_Research_Final.pdf Retrieved from.
Nalbantian, H. R., & Schotter, A. (1997). Productivity under group incentives: An experimental study. *The American Economic Review, 87*(3), 314–341.
National Retail Foundation (2014). *NRF CMO council marketing allocation study survey*.
Noble, S. M., Griffith, D. A., & Weinberger, M. G. (2005). Consumer derived utilitarian value and channel utilization in a multi-channel retail context. *Journal of Business Research, 58*(12), 1643–1651.
Oldroyd, J. B., McElheran, K., & Elkington, D. (2011). The short life of online sales leads. Retrieved July 9, 2019, from Harvard Business Review website. https://hbr.org/2011/03/the-short-life-of-online-sales-leads.
Rasmusen, E. (1987). Moral hazard in risk-averse teams. *The RAND Journal of Economics, 18*(3), 428–435.
Ridlon, R., & Shin, J. (2013). Favoring the winner or loser in repeated contests. *Marketing Science, 32*(5), https://doi.org/10.1287/mksc.2013.0798.
Ryan, T. (2016). *How should commissions work in the era of omnichannel retailing?* RetailWire Retrieved from http://www.retailwire.com/discussion/how-should-commissions-work-in-the-era-of-om (Retrieved July 26, 2017).
Sabnis, G., Chatterjee, S. C., Grewal, R., & Lilien, G. L. (2013). The sales lead black hole: On sales reps' follow-up of marketing leads. *Journal of Marketing, 77*(1), 52–67. https://doi.org/10.1509/jm.10.0047.
Sales Benchmark Index (2011). 3 Sales Compensation Tips for Lead Development Reps | SBI. Retrieved July 9, 2019 *from Sales Benchmark Index website*https://salesbenchmarkindex.com/insights/3-sales-compensation-tips-for-lead-development-reps/.
Skrovan, S. (2017). Why researching online, shopping offline is the new norm - Retail dive. Retrieved from https://www.retaildive.com/news/why-researching-online-shopping-offline-is-the-new-norm/442754/ (Retrieved August 31, 2018, from).
Slater, M. (2014). Tracking the source of your website leads | Webvanta. Retrieved August 31, 2018, from http://www.webvanta.com/post/2014-02-24/tracking-the-source-of-your-website-leads.
Smart Insights (2016). *Lead qualification criteria - Theory and practice.* Smart Insights Digital Marketing Advice Retrieved from http://www.smartinsights.com/lead-generation/lead-generation-strategy/lead-qualification-criteria-theory-practice/ (Retrieved July 26, 2017).
Smith, T. M., Gopalakrishna, S., & Chatterjee, R. (2006). A three-stage model of integrated marketing communications at the marketing-sales interface. *Journal of Marketing Research, 43*(4), 564–579.
Syam, N. B., Hess, J. D., & Yang, Y. (2013). Sales contests versus quotas with imbalanced territories. *Marketing Letters, 24*, 229–244.
Uribe, R., Buzeta, C., & Velásquez, M. (2016). Sidedness, commercial intent and expertise in blog advertising. *Journal of Business Research, 69*(10), 4403–4410.
Verbeke, W., Dietz, B., & Verwaal, E. (2011). Drivers of sales performance: a contemporary meta-analysis. Have salespeople become knowledge brokers? *Journal of the Academy of Marketing Science, 39*(3), 407–428. https://doi.org/10.1007/s11747-010-0211-8.
Watson, T. (2011). *Paying for Results: Aligning Pay with Selling Roles.* Towers Watson.
Web ranking (2010). *Is lead fraud, click fraud 2.0? A new adsense scam targeting google adwords display network advertisers.* Web Ranking Retrieved from http://www.webranking.com/blog/lead-click-fraud-adsense-scam-google-adwords-advertisers (Retrieved July 26, 2017).
Z S Associates (2014). Outside in: The rise of the inside sales team. Retrieved from https://www.zs.com/-/media/pdfs/zs-reality-works-isr-executive-summary.pdf?la=en.
Zoltners, A. A., Sinha, P. K., & Lorimer, S. (2013). The Growing Power of Inside Sales. *Harvard Business Review*. Retrieved July 10, 2019, from https://hbr.org/2013/07/the-growing-power-of-inside-sa.

Somnath Banerjee is an Assistant Professor of Marketing at North Dakota State University. He received his Ph.D. from University of Central Florida. His research interests include sales force management, digital marketing, retailing, marketing strategy and analytical models. His research has been published in *Journal of Retailing and Journal of Global Marketing*. Prior to pursuing his career in academics, he worked in the area of sales and distribution management at a retail financial services company. He has taught courses in sales management, digital marketing and marketing strategy at North Dakota State University.

Pradeep Bhardwaj is the Carl H. Galloway Professor of Marketing at University of Central Florida. Prior to joining UCF, Pradeep served on the faculty at UCLA, UNC- Chapel Hill, and UBC Vancouver. At UBC, Pradeep was the BC Innovation Council Chair in Sales and Sales Management. He received his Ph.D. from University of Toronto and MBA from Simon Fraser University, Vancouver. His research interests include sales force management, channel management, customer relationship management, pharmaceutical marketing, and corporate social responsibility. His research has appeared in *Marketing Science*, *Management Science*, *Journal of Business Research*, and *Quantitative Marketing and Economics*.