DIGITAL ACCESS TO
SCHOLARSHIP AT HARVARD
DASH.HARVARD.EDU

HARVARD LIBRARY
Office for Scholarly Communication

The Effects of Quota Frequency on Sales Force Performance: Evidence from a Field Experiment

The Harvard community has made this article openly available. **Please share** how this access benefits you. Your story matters

The Effects of Quota Frequency on Sales Force Performance: Evidence from a Field Experiment

Doug J. Chung
Das Narayandas

The Effects of Quota Frequency on Sales Force Performance: Evidence from a Field Experiment

Doug J. Chung
Harvard Business School

Das Narayandas
Harvard Business School

Working Paper 17-059

The Effects of Quota Frequency on Sales Force Performance:
Evidence from a Field Experiment

Doug J. Chung, Harvard Business School

Das Narayandas, Harvard Business School

December 2016

Abstract

We collaborate with a Swedish retail chain to conduct a field experiment in which we change the sales force compensation scheme from a monthly to a daily quota plan. This intervention, along with a control group that did not encounter a change in compensation structure, allows us to analyze the effect of quota frequency on sales force performance. Over a given time frame (i.e., a month), we find that shifting to a temporally more frequent quota plan—the daily quota plan as compared to the monthly quota plan—leads to an increase in sales performance, mainly for low-performing salespeople, by preventing them from giving up in the latter days of a month. However, we find high-performing salespeople to give up more frequently in earlier days of a month under the daily quota plan. With more frequent quotas, salespeople sell more quantities of low-ticket items, which benefit the firm through a decrease in returned merchandise. However, with quotas set over shorter time horizons, even the highest-performing salespeople focus mainly on incremental sales, resulting in a decrease in sales of higher-value-added and higher-margin products, thereby hurting firm profits.

Key words: sales force compensation, field experiment, quotas, quota frequency, commissions, bonuses, goals.

1. Introduction

Incentives are ubiquitous, especially in a capitalistic free-market economy. They are believed to provide one of the primary motivations for people to work. This is especially true in the domain of personal selling. Despite recent advances in sophisticated marketing techniques using big data to persuade customers and encourage purchases, personal selling still remains a significant (and in most industries the only) function in firm–customer communications. According to the U.S. Bureau of Labor Statistics, 14 million people are employed in personal selling, which is about 10% of the entire U.S. labor force (U.S. Department of Labor, 2012). U.S. firms spend over $800 billion annually on personal selling, an amount that is 4.7 times greater than total spending on all media advertising ($169.5 billion) and more than 20 times greater than total spending on Internet advertising ($39.5 billion) (Zoltners, Sinha, & Lorimer, 2013). A large proportion of spending on personal selling is used to incentivize and motivate salespeople to exert greater selling effort. The sales force compensation plan is considered to be the primary tool that managers use to incentivize and motivate salespeople. With so many people and resources at stake, the design of the sales force compensation plan becomes of great strategic importance to firms.

A sales force compensation plan typically consists of a fixed salary plus variable pay conditional on meeting a sales quota (i.e., achieving a certain threshold of performance). Firms commonly use quotas; about three-quarters of U.S firms use some form of quotas (Joseph & Kalwani, 1998). **Figure 1** shows illustrative examples of several quota-based plans. Firms typically use quotas as achievement goals to evaluate performance and consider a salesperson to have had a successful period (e.g., month or year) upon achieving that period's quota. But how should a sales manager

1

design a quota-based compensation plan? In this research we specifically attempt to answer, through a field experiment, the following questions: What is the appropriate frequency of quotas? That is, at what intervals should quotas be set, and how often should they be evaluated? Would frequent quotas increase or decrease sales performance?[1] If so, which salespeople would be affected? Does a salesperson's quality of effort falter with frequent quotas? Would other behavioral changes occur if the frequency of sales quotas was changed?

Despite the ubiquitous use of sales quotas, academics have remained skeptical about their effectiveness. The primary argument against the use of sales quotas is that their nonlinear nature commonly pushes salespeople to less powering areas of incentives (Holmstrom & Milgrom, 1987; Lal & Srinivasan, 1993). That is, the motivational effects of achieving a sales quota set by the firm diminish when a salesperson's cumulative performance either has already surpassed the quota or is too far away from achieving it. Increasing the temporal frequency of quotas (e.g., from monthly to daily) would make a quota-based plan similar to a linear commission plan in that it would provide constant motivation to the sales force regardless of past cumulative sales.

Relatedly, there is a vast literature in psychology on goals, such as sales quotas, and their effect on motivation (for an extensive survey, see Latham & Locke, 1991). Concepts such as the "goal-gradient hypothesis" (Hull, 1932; Hull, 1938; Kivetz, Urminsky, & Zheng, 2006) and "goals serving as reference points" (Heath, Larrick, & Wu, 1999) have advocated for temporally shorter and more frequent goals. The key points here are that (1) individuals will exert higher effort as their

---

[1] We refer to "frequent quotas" or "frequent quota plans" as quota-based plans that have more evaluation and payment periods than less frequent quota plans. In our context, a daily quota plan represents a frequent quota plan and a monthly quota plan represents a less frequent quota plan.

performance gets closer to a goal and (2) goals will show diminishing returns similar to value functions in Prospect Theory (Kahneman & Tversky, 1979), and thus splitting a grand goal into multiple smaller goals will induce higher combined utility, leading to greater effort. Similarly, in the education literature, researchers have found that frequent testing results in better performance outcomes for students (for an extensive survey, see Bangert-Drowns, Kulik, & Kulik, 1991). According to these schools of thought, setting more frequent quotas should lead to higher sales performance. However, as Darmon (1997) indicates, to motivate salespeople to achieve objectives, quotas should be challenging. Splitting a grand quota into multiple finer quotas—and thus more frequent quotas—would be the same as replacing one challenging quota with many less challenging quotas. Hence, the existing literature has not clarified how increasing (or decreasing) the frequency of quotas would affect sales performance.

To examine how the frequency of quotas affects sales performance, we collaborate with a major retail chain in Sweden to conduct a field experiment. We implement a one-time intervention in which, holding everything else constant, we changed the sales force compensation scheme from a monthly to a daily quota plan. We also had a control group of several stores whose sales force did not encounter a change in compensation structure during the observation period. We use the variation in performance between the salespeople who experienced the change (the treatment group) and those who did not (the control group) to account for any seasonal and other exogenous fluctuations so that we can analyze, as cleanly as possible, the effect of quota frequency on sales performance.

Our survey of relevant literature discussed above suggests that because a daily quota plan gives salespeople a fresh start each day, it should help maintain high motivation among the salespeople throughout the month. For example, under a monthly quota plan salespeople who had a series of bad luck early in the month may decide to give up late in the month because there is no chance that they can meet or exceed the quota set by the firm. This would not be the case under a daily quota plan, as every day would be a new day. However, it is also possible that the salespeople under the daily quota plan may exhibit another kind of giving-up effect. For example, salespeople under the daily quota plan could give up if, due to bad luck, they got off to a slow start at the beginning of a day, because they might assess their chances of being able to meet quota that day, even with hard work, as slim—an action that the salespeople might not resort to in the monthly quota plan because any sales accumulated would count toward the quota at the end of the month. Furthermore, the flexibility to intertemporally allocate effort across multiple periods may make the monthly plan more effective, as a change to a daily quota plan may merely provoke income targeting within a day (Camerer, Babcock, Loewenstein, & Thaler, 1997).

In addition to the above-mentioned effects, the daily quota plan could potentially increase anxiety and stress among salespeople, as they would constantly worry about meeting quota day in and day out, resulting in demotivation. Relatedly, as we witnessed with Sears in 1990s, Marsh in the 2000s, and more recently with Wells Fargo, there can also be negative effects of overly aggressive incentive compensation plans (Zoltners, Lorimer, & Sinha, 2016), leading to unethical behavior and fraud (Schweitzer, Ordóñez, & Douma, 2004). In our context, daily quota plans may induce salespeople to become overly aggressive, selling products that would ultimately be returned later

and thus hurting the firm in the long run. Hence, it is unclear how the change in the compensation scheme from a monthly to a daily quota plan would affect sales performance across multiple dimensions.

Overall in this paper, we uniquely contribute to the sales management literature in several ways. First, we conduct a large-scale field experiment with full-time salespeople of a major retail chain by exogenously changing the compensation plan along with a control group to account for any normal/temporal changes so that we can solely isolate the causal effect of quota frequency on sales performance. Second, to the best of our knowledge, we are one of the first to directly examine quota frequency in a sales force setting.[2] Third, we investigate the effect of quota frequency not only on sales revenue but also on various other dimensions of performance such as quality and type of effort by monitoring and measuring product returns and changes in product focus. Finally, we examine the heterogeneous effects of quota frequency across salespeople of different types.

Substantively, we find that a change from a monthly to a daily quota plan (frequent quotas) increases sales performance—but mainly for low-performing salespeople. Because every day is a fresh start under the daily plan, salespeople's motivations are intact throughout the month, whereas under the monthly plan salespeople give up if they are too far away from meeting quota in the latter days of the month. In contrast, we find potentially negative effects of quota frequency for high-performing salespeople as they sometimes give up within a day, an effect that did not exist under the monthly quota plan. Surprisingly, in the daily quota plan, we do not find any evidence of overaggressive

---

[2] Chung, Steenburgh, and Sudhir (2014) explored the concept of quota frequency. However, their analysis was based on counterfactual simulations using estimates from their structural model and not inferred directly from the data.

selling that result in an increase in product returns. Conversely, we find salespeople to sell more quantities of low-ticket items, a situation that results in a decrease in returned merchandise, thereby benefiting the firm. Interestingly, however, frequent quota plans cause even the highest-performing salespeople to focus mainly on incremental sales, resulting in a decrease in sales of high-value-added, high-margin products that hurt the firm's profitability.

The rest of the paper is organized as follows: In Section 2 we explain the institutional details of the firm and the field experiment design. In Section 3 we present the empirical model-specification, and in Section 4 we discuss the results. In Section 5 we present our conclusion.

2. Institutional Details and Field Experiment Design

The focal firm under study is a highly regarded retail chain operating 94 stores in Sweden. It sells mostly small to medium-sized consumer electronic goods such as cellular phones, gaming systems, tablet computers, wireless routers, data storage, network appliances, digital versatile disc (DVD) players, and other small home appliances. It also sells accessories (e.g., networking accessories, headsets, and phone cases) as well as electronic parts (e.g., semiconductors and switches) for various consumer electronics and home appliances. Product prices range from less than $1 to $500 or more, with an average price of slightly over $20. All of the stores are company-owned, and the firm employs a direct sales force of about 350 salespeople at any given time across the stores. The compensation plan of sales employees consists of a fixed salary plus a variable commission on sales. The commission rate (and thus the commission amount) is determined by sales performance, measured in average sales per hour (SPH).

The details of the variable component of the compensation plan are given in **Table 1**. There are five levels of commission a salesperson can receive. For example, if a salesperson's average SPH was $150 at the end of the evaluation period, he or she would receive a commission of 0.27% for every dollar sale. If a salesperson's average SPH was $250 or more, he or she would receive the highest commission level of 2.0%. Note that the quotas are in average SPH instead of in absolute amounts. Because of this characteristic, along with the discrete nature of the tiered commission levels, a salesperson's variable pay would have a kink at each tier (quota) level that resembles a quota-based commission plus lump-sum bonus scheme (**Figure 1d**). **Figure 2a** illustrates the level of variable pay for a salesperson who is assigned 180 hours a month. The figure shows that, as a salesperson achieves each quota level, there is a step jump in pay due to discretely accelerating commission rates. A salesperson would make $1,200 in variable pay if his or her monthly sales totaled $60,000.

The field experiment and thus the change in the sales force compensation plan took effect on May 1, 2015. Holding everything else constant, including the commission rate per quota achieved and the quotas in terms of average SPH (**Table 1**), only the evaluation period changed (from a month to a day) on May 1. That is, up until the end of April 2015, the commission rate for each salesperson was assessed by summing all sales that person made and dividing them by all hours that person worked within a month, whereas the commission rate was evaluated daily as of May 2015. **Figure 2b** illustrates commission pay as a function of daily sales for a salesperson who is assigned 10 hours a day. The overall shapes of **Figure 2a** and **Figure 2b** look very similar, as only the

frequency of evaluation changed while the commission rate and the quotas in **Table 1** remained the same.

In addition to changing the compensation structure for one group of employees across the firm's stores (the treatment group), we also arranged for several stores and their salespeople to experience no changes in the compensation plan during the experiment (the control group). This setting provides us with the classic difference-in-differences research design (Card & Krueger, 1994), which uses the difference in sales performance from the treatment group to the control group to identify the magnitude of the treatment effect (in our case, the daily quota plan), taking into account any normal/temporal changes (e.g., seasonality or firm-level advertising) in sales that would have occurred regardless of the change in the compensation plan. The treatment group therefore consisted of salespeople assigned monthly quotas in April and daily quotas in May, and the control group consisted of salespeople assigned monthly quotas in both April and May. With help from management, we chose stores in the control group such that they embodied a representative sample of stores across geographical areas of the country.[3] The majority of Sweden's population resides in the southern tip of the country, concentrated in the suburbs and city centers of the three most populous cities, Stockholm, Gothenburg, and Malmö. We confronted two main challenges in choosing our control stores.

First, the focal firm initially did not want any control stores, to avoid any complication in implementing the changed compensation plan. Also, the firm's management was extremely

---

[3] The firm had only 8 stores in the entire central and northern part of Sweden; we omitted these stores from our analysis, leaving us with 86 stores.

concerned about fairness across employees. Many members of management (including the sales director, the information technology manager, and the vice president of operations) had risen through the ranks from being a store salesperson, and fairness was one the firm's primary human resources (HR) policies.[4] Thus, the concept of having some employees on a different compensation plan was deemed to be extremely inappropriate.

Second, we needed to choose stores that showed similar characteristics to surrounding stores yet also had to avoid choosing stores that were too close in geographical proximity to treatment stores so as to avoid the "water cooler effect."[5] That is, we did not want the salespeople in the control and treatment groups to communicate with each other, as such communication could potentially bias the outcome of the field experiment. For our control group, we ended up selecting five stores (consisting of 26 salespeople) not in very close proximity with other stores yet in the metropolitan areas of Stockholm, Gothenburg, and Malmö. To further avoid the water cooler effect, we made sure that there were no major sales training programs or conferences around the time of the field experiment, as these events could have potentially led to a spillover of information. Also, we made sure that there were no employee transfers between the treatment and control stores during the experiment. As a matter of fact, the focal firm's management was very concerned about the water cooler effect as well, for a different reason. As mentioned above, the firm prided itself on its HR

---

[4] Sweden is often cited as having one of the highest effective tax rates in the world. It is also known for having generous social security benefits, including child care, health care, housing allowances, and welfare. Sweden also ranks highly with regard to gender equality (World Economic Forum, 2014). Hence, fairness is a relatively strong social norm in Sweden.

[5] The term "water cooler effect" refers to the phenomenon in which employees gather around the office water cooler to talk. In our context, "water cooler effect" refers to the flow of information that potentially disrupts the motivation of the salespeople and thus the direction and effect size of the experiment treatments.

policy of one-for-all. This is the main reason why, for our control group, we were limited to only five stores for an observation period of one month.

It is not clear, ex ante, how the change in the compensation plan from a monthly to a daily quota would affect the performance of salespeople. On the one hand, the flexibility of having various time periods to allocate effort may make the monthly plan more ideal and thus effective. Furthermore, the increased stress levels of constantly worrying about meeting quota day in and day out may have a demotivating effect on sales productivity. On the other hand, the daily quota plan gives salespeople a fresh start each day and thus their variable pay would not be a function of past performance but rather only current performance. The fresh new start each day may help maintain high motivation throughout the month. For example, under a monthly quota plan, a salesperson who had bad luck earlier may give up later in the month because he or she realizes there is no chance of meeting quota. This would not be the case under a daily quota plan, as every day, de facto, would be a new day. Alternately, under a daily quota plan it is possible that there might be more giving up within a day—that is, a salesperson may give up if unlucky at the beginning of the day because odds of meeting quota that day would be slim. However, salespeople might not give up within a day under the monthly quota plan, as any further sales accumulated in that day would still count toward the quota set for the month. Hence, it is not entirely clear which of the two plans would be more effective.

Table 2 shows the average SPH for the control and treatment groups across April and May 2015. Once again, the compensation plan changed from a monthly to a daily quota plan as of May 1. We can see the benefit and importance of having a control group. Given the 10% improvement

in sales productivity (i.e., an increase in average SPH from $149.06 to $163.96) across the two periods for the treatment group, one would conclude that the plan change was immensely successful and that the daily quota plan outperforms the monthly quota plan. However, taking into account the differences in productivity of the control group across the two periods, the conclusion is not so obvious. There seems to be only a marginal gain in the treatment group over the control group—a 10% increase for the treatment group compared with a 9% increase (i.e., an increase in average SPH from $149.17 to $162.75) for the control group.

The focal firm prides itself on being known for excellent customer service. It trains its salespeople to be knowledgeable in the entire range of its products' technical specifications and their applications. Also, the firm continually ensures that salespeople regularly undergo a significant amount of customer service training well above the industry norm in the country. Hence, management was concerned that the daily quota plan, while potentially increasing short-term motivation, might be harmful if it resulted in salespeople aggressively selling unnecessary products to customers, which could in turn result in an increase in returned merchandise. This concern was further aggravated by the fact that the firm did not penalize salespeople for returns by reducing their compensation in either the daily or the monthly quota plans.

To examine whether there was a change in returns, we tracked all returned products and mapped them back to their original sales. We then computed the ratio of returns per sales amount to create the variable returns-to-sales (RTS) ratio. For example, if a salesperson sold $1,000 worth of goods on April 1, of which $30 worth of goods were eventually returned, the RTS ratio would be 0.03. The RTS ratio, which is normalized by total sales, provides insights into problems that may be associated

with service quality. **Table 3** shows the RTS ratio for the control and treatment groups across the two periods covered by our study. Contrary to management's concerns, there was a decrease of three per mille points (from 0.065 to 0.062) in the RTS ratio for the treatment group after the daily quota plan went into effect. Again, however, we need to see the difference in the treatment and control groups, as the decrease in returns for the treatment group could have been a result of seasonal variations. Surprisingly, we see that the control group actually witnessed an increase in the RTS ratio (from 0.052 to 0.054), suggesting that there was a decrease in returns when the daily quota plan was implemented. Based on the aggregate analysis above, we formally model sales as a function of quota frequency in the proceeding section.

3. Model

We model sales productivity Y_{iwd} of salesperson i in week w at day d as a multiplicative function of the salesperson-specific effects α_i, common weekly time trends γ_w, the compensation plan z_{iwd}, and an idiosyncratic shock ε_{iwd} such that

$$Y_{iwd} = \exp\left(\alpha_i + \gamma_w + \delta z_{iwd} + \varepsilon_{iwd}\right), \tag{1}$$

where z_{iwd} is a binary variable with a value of one if salesperson i is in the treatment group and w is a week of the treatment—that is, in the daily quota regime. The parameter α_i represents unobserved individual heterogeneity that is constant over time, and the parameter γ_w represents any intertemporal variations that are common across all salespeople in a particular week. Examples would include seasonal fluctuations in demand or firm advertising that equally affects all salespeople

in week w. The parameter δ represents any increase (or decrease) in salesperson i's effort as a result

of the change in quota frequency of the compensation plan from monthly to daily. The idiosyncratic

shock ε_{iwd} represents any other elements that affect sales, such as luck (either good or bad). We

assume that these idiosyncratic shocks are independently, identically, and normally distributed

across salespeople and time with mean zero and variance σ^2. We take the logarithmic transformation

of Equation (1) for our empirical model such that

$$\log\left(Y_{iwd}\right) = y_{iwd} = \alpha_i + \gamma_w + \delta z_{iwd} + \varepsilon_{iwd}\,. \tag{2}$$

Our one-time intervention in addition to the presence of a control group adheres to a difference-

in-differences framework (Card & Krueger, 1994). A salesperson once assigned to the treatment

group will always be assigned to the treatment group, and the same applies to the control group.

Thus, our identification of the treatment effect will result from any difference in productivity

between the treatment group and the control group after controlling for natural trends common to

both groups.

Figure 3 shows an illustrative example. If we were to simply measure the increase in

productivity for the treatment group before and after the treatment (length C in **Figure 3**), we

would be capturing not only the treatment effect—the increase in sales productivity due to the

change from a monthly to a daily quota compensation scheme—but also any other normal or

temporal effects that would have happened regardless of any changes in compensation structure

(length B in **Figure 3**). Thus, it is important to have a control group that is not exposed to the

treatment to be able to measure the normal/temporal change. We use the difference between the

13

total effect and the normal/temporal effect to obtain the true treatment effect (length A in **Figure 2**). Technically, we would be able to identify the treatment effect just by cross-sectional analysis using data from periods after the treatment (May 1) if we assume homogeneity—that is, the sales of the treatment and the control group are identical before the treatment. Our sample size of 337 employees, although quite large for a field study, is not sufficiently large enough for random assignments in treatment conditions to wash away individual fixed effects. Our difference-in-differences approach allows the use of full information from the data to better control for individual heterogeneity, giving us more precise estimates of the treatment effect. The difference-in-differences framework relies on the parallel trend assumption that may not hold for observational data typically used for analyses in this framework because of selection bias—that is, people self-select into different treatment levels. Because we have random treatment group assignments and thus have experimental data, our results do not suffer from this problem. We present the results of various model specifications in the next section.

4. Results

The first column of **Table 4** shows the result of Equation (2) with the logarithm of SPH per day as the dependent variable. We find that, on aggregate, sales productivity increases by 4.9% under the daily quota scheme.[6] The second and third columns of **Table 4** show the results of deviant models of Equation (2). Specifically, to examine from whom the increase in sales is coming, we allow for different slope parameters by segments of salespeople such that

---

[6] Because of the logarithmic transformation of our dependent variable, the magnitude of the estimated treatment effect is equal to a 4.9% increase in sales productivity, using the transformation formula $\exp{(0.048)}-1=0.0492$.

$$\log\left(Y_{iwd}\right) = y_{iwd} = \alpha_i + \gamma_w + \sum_{r=1}^{R} \delta_r I_{(i \in S_r)} z_{iwd} + \varepsilon_{iwd}\,, \tag{3}$$

where $I_{(i \in S_r)}$ is an indicator function that equals one if salesperson i is a member of Segment r, S_r, and δ_r is the corresponding segment-level parameter. The segmentation is conducted via median and quartile splits with regard to sales productivity before the treatment period in the two- and four-segment models, respectively. In both the two- and four-segment models, we see a common trend. That is, the quota frequency (daily quota plan) has a positive effect on less-productive salespeople. For inference, we turn our attention to the four-segment model in the third column of **Table 4**. We find that quota frequency has a positive and significant effect on the two lower-productivity quartile segments, with a moderate 7% increase in sales productivity for the second quartile and a whopping 18% increase for the first quartile. In contrast, we find, although statistically insignificant, a negative effect of quota frequency for the highest productive quartile.

The shorter goals (more quotas or higher quota frequency) seem to have a positive effect on less-productive salespeople. Why would this be the case? Less-productive salespeople, by definition, are individuals who have greater disutility of effort or who are less efficient, given an amount of effort, or both. Hence, under a monthly quota plan, a salesperson who had bad luck (reduced sales) in the earlier part of the month will give up in the latter days of the month because there is close to no chance of meeting quota at the end of the month, given his or her low effort levels due to high cost of effort. This would not be the case under a daily quota plan, as there is a fresh start every day in which past performance does not affect current payoff and thus does not disturb current motivation. For the high-performing salespeople, because they are more immune to the disutility of effort, even

if they experienced bad luck earlier in the month, they would put in the additional effort necessary later in the month to meet their monthly quotas.

In the same vein, how would salespeople allocate effort within a day?[7] Although we do not observe sales performance in finer detail than a day (e.g., at an hourly level), we can use the variation in level of performance within a month before and after the quota frequency change to infer salespeople's behavior within a day. **Table 5** shows the result of Equation (3) with heterogeneity in the slope parameter with regard to additional effort for the daily quota plan, similar to the model analyzed in column 3 in **Table 4**. However, we only use certain periods of a month to conduct this analysis. The first column in **Table 5** shows the parameter estimates with only using data from the first half of the two months. We find a negative and significant effect for high-performing salespeople. That is, high performers are less likely to work hard in the daily quota plan during the first half of a month. This implies that high-performing salespeople are giving up more frequently within a day. For example, if a salesperson experienced bad luck (slow sales) in the morning, he or she is likely to give up because there is little chance of meeting quota at the end of the day. This would not be the case under a monthly quota plan, as the high effort allocated in the afternoon of that day would help toward achieving the monthly quota. We observe this phenomenon across most of the segments, but it is most noticeable for the highest productivity segment.

The second column of **Table 5** shows the parameter estimates using data only from the latter half of the months. We get, more or less, the same inference as in **Table 4**. The daily quota plan is preventing less-productive salespeople from giving up at the end of the month. In the education

---

[7] We thank Brian Hall for suggesting this analysis.

literature, it has been found that frequent testing results in better outcomes (see Bangert-Drowns, Kulik, & Kulik, 1991 for an extensive survey). Furthermore, in behavioral psychology, it has been found that breaking up a main goal into multiple subgoals resulted in more favorable outcomes (Heath, Larrick, & Wu, 1999). In the marketing literature, Chung, Steenburgh, and Sudhir (2014) explored the concept of quota frequency, but their analysis was based on counterfactual simulations, using estimates from their structural model, and not inferred directly from the data.[8] To the best of our knowledge, sales quota frequency has never been directly analyzed from empirical data, let alone through a field experiment. Our results show that frequent quotas benefit less-productive salespeople similar to the way in which frequent classroom testing helps improve the performance of lower-ability students.

What about the quality of effort? Would there be other behavioral changes with frequent quotas? **Table 6** shows the results, using the logarithm of the RTS ratio per day as a dependent variable, of Equation (2), and Equation (3) with two and four segments. As mentioned above, the RTS ratio is the amount of returned merchandise normalized by total sales. We specifically wanted to check whether the daily quota plan induced salespeople to become overly aggressive, selling unnecessary products to customers, and, in turn, resulted in an increase in returned merchandise. Because returns were not penalized through a deduction in compensation in either compensation plan, management

---

[8] After estimating a structural model of heterogeneous salesforce behavior responding to annual and quarterly quotas, Chung, Steenburgh, & Sudhir (2014) demonstrated, using counterfactual simulations, that removing quarterly quotas (and just keeping annual quotas) leads to greater decrease in performance for low-performing salespeople. In contrast, in this research, we directly test the effect of change in quota frequency on sales performance and provide direct empirical support for this conjecture. In addition, we investigate the effect of quota frequency not only on absolute sales amounts but also on various other dimensions of performance such as quality and type of effort by monitoring and measuring product returns and changes in product focus.

had serious concerns that the amount of returns would increase with the daily quota plan. Results in **Table 6** show the opposite trend. Across the board, in all segments, returns decreased.

Why would this be the case? To better understand the change in salespeople's behavior that caused a decrease in returns, we conduct the following analyses. First, we run Equation (3) using the logarithm of the number of products sold per hour as a dependent variable. The results are presented in the first column of **Table 7**. We see that across all segments the number of products sold increases under a daily quota plan. This indicates that a part of the reason why dollar sales increased under frequent quotas is that the raw number of products sold increased. Then how about the types of products sold? The second column of Table 7 presents the results of Equation (3) with the logarithm of the average price of products sold per day. Here, we see a negative effect across all segments, indicating that salespeople under a frequent quota plan—that is, given shorter split goals—tend to focus on sales of low-ticket, low-margin items. This is not attractive to the firm, especially with regard to high-performing salespeople, who are supposed to focus on high-ticket, high-margin products that bring more profits to the firm. To the best of our knowledge, there has not been any analysis to date focused on the relation between frequency of goals and the type and quality of ensuing effort.

Overall, our results provide sound empirical evidence of various effects of quota frequency that give significant substantive insights on the use of quotas. While having frequent quotas in a compensation plan may increase the absolute sales amount, especially for low-performing salespeople, frequent quotas induce even the most productive salespeople to focus on low-ticket, low-margin

items. Although focusing on low-priced items may decrease the rate of returned merchandise, it will result in a decrease in sales of high-value-added products, as a result hurting firm profits.

5. Conclusion

Monetary incentives, in the form of conditional payments based on performance, are one of the key instruments that organizations use to motivate their employees. These incentives are especially important in the domain of personal selling. A sales force compensation plan typically consists of a fixed salary plus a variable payment conditional on the salesperson achieving a certain threshold of performance—sales goals—referred to as sales quotas. Despite the common use of quotas, we do not fully understand the role of quotas, especially with regard to temporal frequency. We address this gap in this study by examining the causal effect of quota frequency on various dimensions of performance for different types of salespeople. We did so by collaborating with a major Swedish retail chain that sells consumer electronics to run a field experiment with regard to compensation structure. Holding everything else constant, we changed the sales force compensation scheme from a monthly to a daily quota plan. Because the quota was in the form of average sales per hour, the only change was an increase in quota frequency. We also deployed a control group that consisted of salespeople who did not experience a change in compensation. We use the difference in performance of salespeople who were subjected to the change (the treatment group) to those that were not (the control group) to identify, as cleanly as possible, the effect of quota frequency on sales performance.

We find that an increase in quota frequency—the change from a monthly to a daily quota plan—increases sales performance, but mainly for low-performing salespeople, by preventing them from giving up when confronted with early negative sales shocks. Under a daily quota plan, every day is

19

a fresh start; salespeople's motivations are intact throughout the month, whereas under a monthly plan salespeople will give up in the latter days of the month if they are too far away from—and thus have no chance of meeting—the quota set by the firm. In contrast, we find negative effects of quota frequency for high-performing salespeople as they sometimes give up within a day, an effect that does not exist under the monthly quota plan. Interestingly, we find salespeople to sell more quantities of low-ticket, low-margin items that, as a result, leads to a decrease in returned merchandise, thus benefiting the firm. However, frequent quota plans cause even the very high-performing salespeople to mostly focus on incremental sales, resulting in a decrease in sales of high-value-added, high-margin products, thus hurting firm profits.

In summary, our findings will be valuable for firms as they design sales compensation plans for salespeople. While reducing the time horizon for quota setting can potentially motivate the less-productive salespeople to higher performance, firms need to be careful with the unintended consequences of such a move on the high performers. More important, firms should also understand the overall impact of changing the time period for evaluating salespeople's performance on the quality and type of effort such changes will motivate.

There are some limitations to note. Because of concerns over fairness—that is, managers were concerned that some employees were treated differently from others—we were able to deploy a control group for only five weeks. Naturally, if we can maintain a control group that is similar in characteristics and restrict the flow of information about the treatment group for longer periods, we would be able to better analyze the long-term effect of quota frequency. Furthermore, our study was a one-time intervention, and thus we were not able to examine sequence or order effects. Finally,

our venue was in the country of Sweden—a country well known for its high tax rate and generous social security programs. Accordingly, fairness and a sense of community there is a big social norm. One would speculate that our findings and effect size would be more concrete in societies where individualism is more of the social norm. Although not addressed in this study, these areas would be an exciting area for future research.

References

Bangert-Drowns, R. L., Kulik, J. A., Kulik C-L. C. (1991). Effects of frequent classroom testing. *Journal of Educational Research, 85*(2), 89–99.

Card, D., & Krueger., A. B. (1994). Minimum wages and employment: A case study of the fast-food Industry in New Jersey and Pennsylvania. *American Economic Review, 84*(4), 772–793.

Camerer, C., Babcock, L., Loewenstein, G., & Thaler, R. (1997). Labor supply of New York City cabdrivers: One day at a time. *Quarterly Journal of Economics, 112*(2), 407–441.

Chung, D. J., Steenburgh, T., & Sudhir, K. (2014). Do bonuses enhance sales productivity? A dynamic structural analysis of bonus-based compensation plans. *Marketing Science, 33*(2), 165–187.

Darmon, R. (1997). Selecting appropriate sales quota plan structures and quota-setting procedures. *Journal of Personal Selling Sales Management, 17*(1), 1–16.

Heath C., Larrick, R. P., & Wu, G. (1999). Goals as reference points. *Cognitive Psychology, 38*(1), 79–109.

Holmstrom, B., & Milgrom, P. (1987). Aggregation and linearity in the provision of intertemporal incentives. *Econometrica, 55*(2), 303–328.

Hull, C. L. (1932). The goal-gradient hypothesis and maze learning. *Psychological Review, 39*(1), 25–43.

Hull, C. L. (1938). The goal-gradient hypothesis applied to some "Field-Force" problems in the behavior of young children. *Psychological Review, 45*(4), 271–298.

Joseph K., & Kalwani, M. (1998). The role of bonus pay in sales force compensation plans. *Industrial Marketing Management, 27*(2), 147–159.

Kahneman, D., & Tversky, A. (1979), Prospect theory: an analysis of decision under risk. *Econometrica, 47*(2), 263–292.

Kivetz R., Urminsky, O., & Zheng, Y. (2006). The goal-gradient hypothesis resurrected: Purchase acceleration, illusionary goal progress, and customer retention. *Journal of Marketing Research, 43*(1), 39–58.

Lal, R., & Srinivasan, V. (1993). Compensation plans for single- and multi-product sales forces: An application of the Holmstrom-Milgrom model. *Management Science, 39*(7), 777–793.

Latham, G. P., & Locke, E. A. (1991). Self-regulation through goal setting. *Organizational Behavior and Human Decision Processes, 50*(2), 212–247.

Schweitzer, M. E., Ordóñez, L., & Douma, B. (2004). Goal setting as a motivator of unethical behavior. *Academy of Management Journal, 47*(3), 422–432.

U.S. Department of Labor, Bureau of Labor Statistics (2012). *National Occupational Employment and Wage Estimates*, May.

World Economic Forum (2014). *Global Gender Gap Report.* http://reports.weforum.org/global-gender-gap-report-2014/

Zoltners, A. A., Sinha, PK, & Lorimer, S. E. (2013). Are you paying enough attention to your sales force? *HBR Blog Network (blog), Harvard Business Review*, April.

Zoltners, A. A., Lorimer, S. E., & Sinha, PK (2016). Wells Fargo and the slippery slope of sales incentives. *digital article, Harvard Business Review*, September.

Table 1: The Variable Compensation Plan

Level	1	2	3	4	5
Quota ($sales/hour)	140	180	200	235	250
Commission rate (%)	0.27	0.67	0.9	1.5	2.0

The quota and commission rate numbers are approximate for confidentiality reasons.

Table 2: Average Sales per Hour (SPH) by Group across Periods

	April	May
Control	149.17	162.75
Treatment	149.06	163.96

Average SPH is computed by summing up all sales and dividing them by total working hours. Unit is in U.S. dollars.

Table 3: Returns-to-Sales (RTS) Ratio by Group across Periods

	April	May
Control	0.052	0.054
Treatment	0.065	0.062

The RTS ratio is computed by tracking all returns associated with sales within each month and dividing them by total sales.

Table 4: The Effect of Quota Frequency on Sales Performance

Model 1 (Homogeneous)		Model 2 (2 segments)		Model 3 (4 segments)	
Daily quota	**0.048** (0.022)	Daily quota—L	**0.112** (0.023)	Daily quota—Q1	**0.165** (0.027)
		Daily quota—H	-0.009 (0.023)	Daily quota—Q2	**0.070** (0.026)
				Daily quota—Q3	0.016 (0.026)
				Daily quota—Q4	-0.031 (0.026)
Agent fixed effects	Yes	Agent fixed effects	Yes	Agent fixed effects	Yes
Time fixed effects	Yes	Time fixed effects	Yes	Time fixed effects	Yes

Dependent variable: logarithm of sales-per-hour per day. Significance (at the 0.05 level) in bold.

Table 5: The Effect of Quota Frequency on Sales Performance (by Time of Month)

Quantile \ Time of month	First 15 days of a month	Last 15 days of a month
Daily quota—Q1	0.057	**0.140**
	(0.055)	(0.049)
Daily quota—Q2	-0.045	0.058
	(0.053)	(0.048)
Daily quota—Q3	-0.072	-0.006
	(0.053)	(0.048)
Daily quota—Q4	**-0.164**	-0.050
	(0.052)	(0.048)
Agent fixed effects	Yes	Yes
Time fixed effects	Yes	Yes

Dependent variable: logarithm of sales-per-hour per day. Significance (at the 0.05 level) in bold.

Table 6: The Effect of Quota Frequency and Returns

Model 1 (Homogeneous)		Model 2 (2 segments)		Model 3 (4 segments)	
Daily quota	**-0.247**	Daily quota—L	**-0.187**	Daily quota—Q1	-0.139
	(0.074)		(0.081)		(0.094)
		Daily quota—H	**-0.301**	Daily quota—Q2	**-0.229**
			(0.080)		(0.091)
				Daily quota—Q3	**-0.309**
					(0.090)
				Daily quota—Q4	**-0.287**
					(0.089)
Agent fixed effects	Yes	Agent fixed effects	Yes	Agent fixed effects	Yes
Time fixed effects	Yes	Time fixed effects	Yes	Time fixed effects	Yes

Dependent variable: logarithm of returns-to-sales ratio per day. Significance (at the 0.05 level) in bold.

Table 7: The Effect of Quota Frequency on Quantity and Price

Quantile \ Dependent variable	# products sold per hour	Average price of products sold
Daily quota—Q1	**0.191**	-0.022
	(0.025)	(0.014)
Daily quota—Q2	**0.101**	**-0.031**
	(0.024)	(0.013)
Daily quota—Q3	**0.045**	**-0.030**
	(0.024)	(0.013)
Daily quota—Q4	0.019	**-0.054**
	(0.024)	(0.013)
Agent fixed effects	Yes	Yes
Time fixed effects	Yes	Yes

Dependent variable: first column; logarithm of sales quantity per hour per day, second column; logarithm of average price of products sold per day. Significance (at the 0.05 level) in bold.

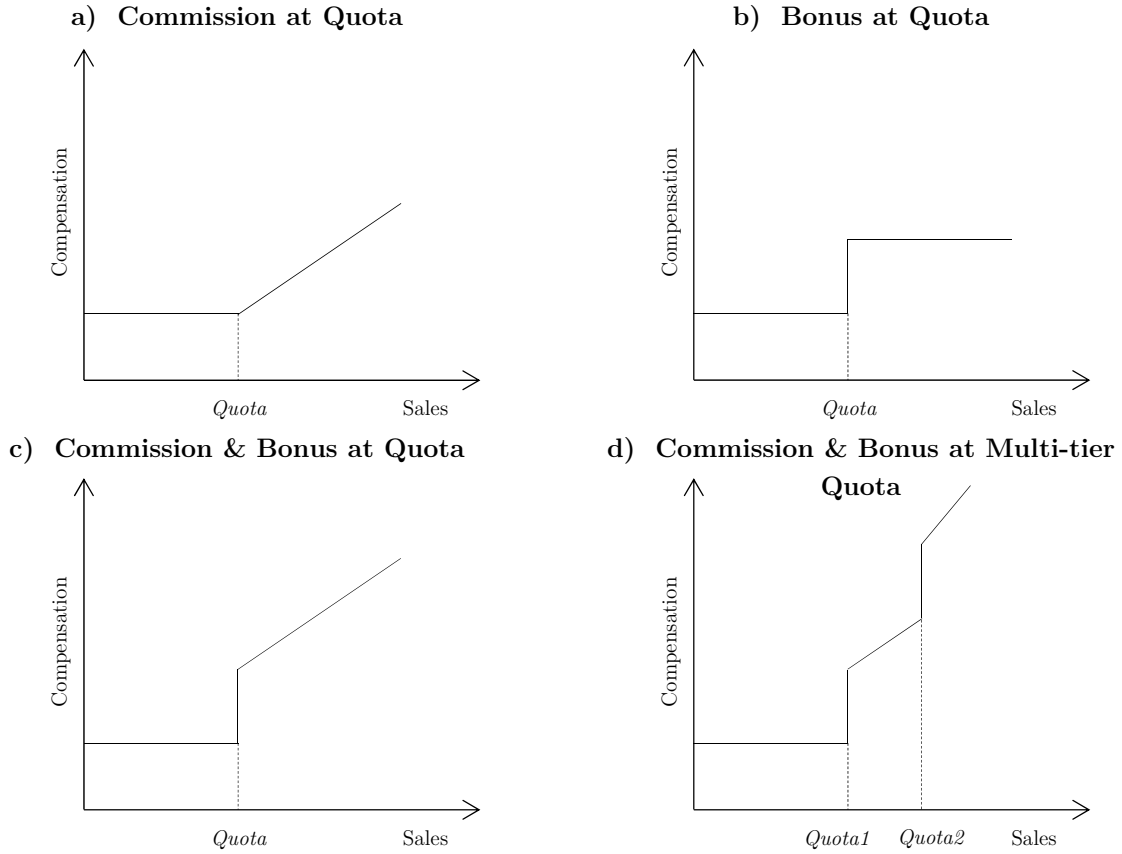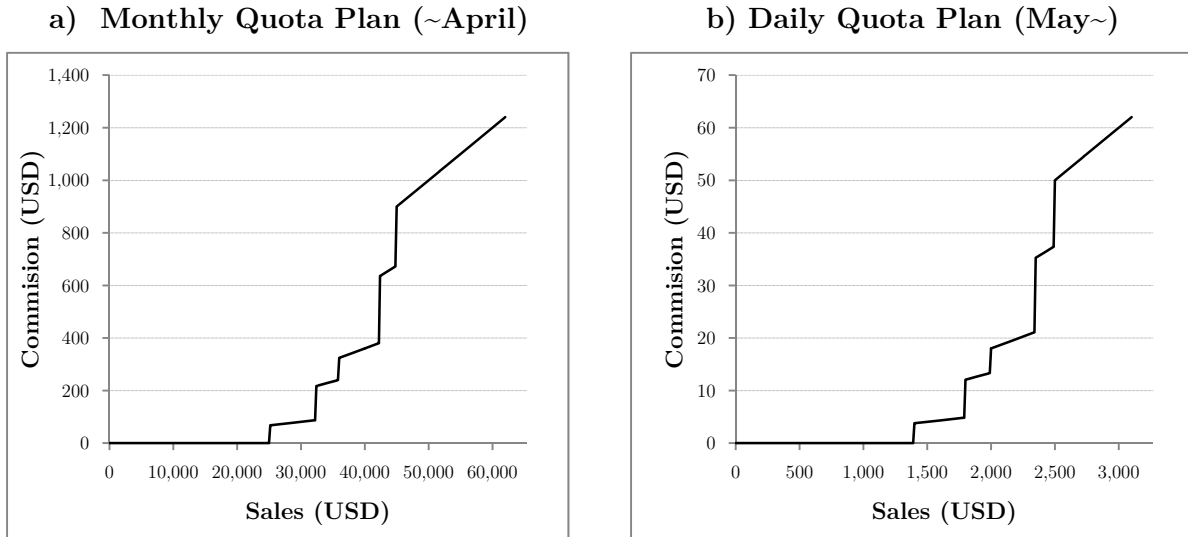## Figure 1: Types of Variable Compensation Plans with Quotas

a) Commission at Quota

b) Bonus at Quota

c) Commission & Bonus at Quota

d) Commission & Bonus at Multi-tier Quota

Figure 2: Relation between Sales and Commission

a) Monthly Quota Plan (~April)

Illustrates monthly commission pay for a salesperson assigned 180 hours a month (before April 2015)

b) Daily Quota Plan (May~)

Illustrates daily commission pay for a salesperson assigned 10 hours a day (after May 2015)

Figure 3: Difference-in-Differences Design