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Referral Reward Size and New Customer Profitability

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Abstract. Managers use referral reward programs to stimulate positive word of mouth by rewarding existing customers for every new customer they successfully refer. A key decision variable in these programs is the referral reward size—but what are the effects of offering smaller versus larger rewards? Whereas previous research has studied the impact of referral reward size on the *number* of referred new customers, we, for the first time, investigate its effect on the *profitability* of referred new customers. We analyze a field experiment involving more than 160,000 bank customers and test the generalizability of the results with archival data from approximately 270,000 telecommunications customers. In both studies, we find that **even though larger referral rewards lead to the acquisition of more new customers, they considerably decrease the profitability of referred new customers.** Managers need to take both of these effects into account when deciding about their program design.

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Keywords: referral reward programs • reward size • customer profitability • field experiment

1. Introduction

Companies use referral reward programs to stimulate positive word of mouth by rewarding existing customers for **every new customer they successfully refer** (e.g., Schmitt et al. 2011, Garnefeld et al. 2013, Verleghe et al. 2013). A key design variable in these programs is the size of the reward an existing customer receives when his or her referral results in a new customer for the firm. Managers expect that larger rewards result in *more new customers* than they would have acquired with smaller rewards. Accordingly, research on referral rewards has largely focused on their effect on existing customers' likelihood of making a referral (e.g., Wirtz and Chew 2002, Ryu and Feick 2007), potential new customers' likelihood of accepting a referral (Jin and Huang 2014), and ultimately the number of new customers acquired via referrals (Hinz et al. 2011). But how does referral reward size influence the *profitability of referred new customers* for the firm? Scholars have speculated that reward size has an effect on new customer profitability and called for research on this question (Trusov et al. 2009, Schmitt et al. 2011, Van den Bulte et al. 2018). However, to the best of our knowledge, there is no empirical research yet that provides an answer.

We contribute to the literature by addressing this gap. Our study uses a field experiment involving more than 160,000 customers of a bank to identify the effect of referral reward size on referred new customers'

profitability. We test the generalizability of our findings with archival data from approximately 270,000 customers of a telecommunications service provider.

The direction of the effect of referral reward size on new customer profitability is not obvious; rather, different theories suggest that it could go both ways. On the one hand, larger rewards could result in more profitable referred new customers. Reciprocity (Gouldner 1960) suggests that customers who receive a larger compensation may want to give back more. Impression management (Xiao et al. 2011) could lead existing customers to only recommend the company if they are sure that the offer fits their peers' needs, because they do not want to appear greedy. On the other hand, the effect of reward size on new customers' profitability could be negative. For example, a larger reward could motivate a referrer to expand his or her reach toward peers who do not match the firm well and therefore are less profitable (Bampo et al. 2008, Van den Bulte et al. 2018).

We find that larger referral rewards increase the number of acquired customers but have a negative effect on the profitability of these referred new customers. In the field experiment with the bank, the mean profitability of a referred new customer over his or her first two years with the bank decreases by 48%, from €84.46 with a small reward (€20) to €43.77 with a large reward (€50). Our findings have important implications for the bank, which disregarded the effect

of reward size on referred customers' profitability in the past and thus considerably overestimated the benefit from incentivizing existing customers with large rewards. We replicate the negative effect of reward size on referred new customers' profitability in a second study in the telecommunications service industry.

The remainder of this article proceeds as follows. We discuss previous literature to specify our contribution and highlight the theoretical background of our studies. Next, we provide details on our field experiment with a bank, discussing our study design, results, and robustness checks. We then test the generalizability of our findings with archival data from a telecommunications service provider. Table 1 provides an overview of all the data. We conclude with a summary, highlight management implications, and discuss limitations and opportunities for future research.

2. Literature

Previous research on referral reward programs mostly finds beneficial effects: Schmitt et al. (2011) show that bank customers acquired through referral reward programs are more profitable for the firm than customers acquired by other means. Probably referrers recruit more profitable customers than marketers because of better active matching: referrers know better which products match their peers' needs (Van den Bulte et al. 2018). Also, homophily may play a role: the similarity between friends suggests that a referred new customer is more likely to be a good match with the firm (Van den Bulte et al. 2018). In addition, the social bond between a referred new customer and his or her referrer may induce the referred new customer to stay more loyal to the firm (Van den Bulte et al. 2018). Armelini et al. (2015) and Wolters and Gedenk (2018) replicate the study by Schmitt et al. (2011) and show that the effect of referral reward programs on customer profitability depends on the referred product.

Also, referral reward programs are more likely to help recruit profitable new customers if the firm targets the right existing customers. Specifically, the profitability of referred new customers depends on existing customers' profitability (Kumar et al. 2007, 2010; Armelini et al. 2015; Viswanathan et al. 2018), tenure (Van den Bulte et al. 2018), successful prior referrals (Kumar et al. 2007, 2010), and personality (Viswanathan et al. 2018). The positive effects of referral reward programs even extend to the referrer. Garnefeld et al. (2013) find a positive impact on the loyalty of the referrer, who is less likely to churn after recruiting a new customer. Given their potentially high attractiveness for acquiring new customers, it is not surprising that referral programs are very

Table 1. Overview of Data Sets

Analysis	Setting	Number of existing/ new customers	Observation period	Rewards	Special customer characteristics	Goal of the analysis	Section
Focal field experiment	Bank	~160,000/237	May/July 2013	€20/€50	Selected by the bank to receive referral reward mailing	Investigate effect of reward size on new customer profitability	4.2, Appendices B and C
Robustness check 1	Bank	1.2 million/368	May/July 2016	€20	None (random sample)	Rule out seasonality as alternative explanation	4.3, Appendix A
Robustness check 2	Bank	~6 million/3,327	May/July 2013	€20/€50	Not selected by the bank to receive referral reward mailing	Rule out special customer characteristics and mailing as alternative explanations	4.3
Generalizability	Telecom	~270,000/20,564	July 2009–June 2012	€5–€15	None (all customers)	Assess generalizability of the findings in another industry and with different reward sizes	5.2, Appendices E and F

popular in practice. Still, managers face a nontrivial challenge that goes beyond targeting the right kind of referrers: choosing the size of the referral reward.

Extant research shows that referral reward size affects how many referrals are made and accepted (e.g., Ryu and Feick 2007, Jin and Huang 2014). Table 2 provides an overview on respective studies. Several experimental studies use survey data to analyze how referral reward size affects the likelihood of making a referral (e.g., Wirtz and Chew 2002, Ryu and Feick 2007) and of accepting it (Verlegh et al. 2013, Jin and Huang 2014). Analytical research (Biyalogorsky et al. 2001, Kornish and Li 2010, Xiao et al. 2011) relies on behavioral assumptions to determine the optimal referral reward strategy. Prior literature shows that the effect of referral reward size depends on tie strength between the referrer and the recommendation receiver (Ryu and Feick 2007, Verlegh et al. 2013), deal proneness of the referrer (Wirtz and Chew 2002),

delight of the referrer (Biyalogorsky et al. 2001, Wirtz and Chew 2002), the referrer's fear of making a negative impression (Xiao et al. 2011, Wirtz et al. 2013), the referrer's concern about the satisfaction of (potential) new customers (Kornish and Li 2010), the type of reward offered (Jin and Huang 2014), and who receives the referral reward (Ryu and Feick 2007). Among the studies in Table 2, those by Jin and Huang (2014) and Hinz et al. (2011) are the only ones that analyze field data. They find a positive effect of referral reward size on the number of referrals made and on the number of successful referrals, respectively.

Although research has investigated the effect of referral reward size on the number of new customers, no study has analyzed whether referral reward size also affects the profitability of referred new customers. Several researchers (e.g., Trusov et al. 2009, Schmitt et al. 2011) have explicitly called for further

Table 2. Previous Research on the Effect of Referral Reward Size

Study	Setting	Key findings	Effect on number of referred new customers	Effect on referred new customers' profitability
Biyalogorsky et al. (2001)	Analytical model	Firms should offer larger referral rewards to increase the number of referred new customers, especially in settings where customer delight is difficult to achieve.	X	—
Wirtz and Chew (2002)	Laboratory experiments	Larger rewards increase word-of-mouth recommendations from satisfied customers.	X	—
Ryu and Feick (2007)	Laboratory experiments	Reward size does not influence referral likelihood, regardless of the brand strength of the referred product and the tie strength between referrer and referred customers.	X	—
Kornish and Li (2010)	Analytical model	The greater the referrer's concern about the outcome for the referred customer, the larger the reward should be. Highly sensitive categories (e.g., child care or mental health) should not offer referral rewards, but lower prices instead.	X	—
Xiao et al. (2011)	Analytical model	Large referral rewards may not be appropriate when the referrer is concerned about creating a negative impression.	X	—
Hinz et al. (2011)	Archival data	Doubling referral reward size increased the average number of referrals by 50%.	X	—
Wirtz et al. (2013)	Laboratory experiments	Recommendation behavior is driven by the referrers' perception of how they will be viewed by the referred customer. The effect of referral reward size depends on tie strength between referrer and referred customer.	X	—
Jin and Huang (2014)	Field and laboratory experiments	Larger monetary rewards increase referral rates for weak and for strong brands.	X	—
This study	Field experiment, archival data	Larger referral rewards increase the number of successful referrals but negatively affect referred new customers' profitability.	X	X

Note. X = studied; — = not studied.

research in this field. Van den Bulte et al. (2018) speculate that larger rewards may negatively influence the profitability of referred new customers because referrers may find poorer matches with the firm. We contribute to the referral literature by analyzing the effect of referral reward size on the profitability of referred new customers for the first time.

Our study is similar in spirit to research investigating the effect of promotion size in customer acquisition on the profitability of the acquired customers. With both promotions and referral rewards, managers need to choose the size of the incentive, keeping in mind the effect on the number and profitability of new customers. Anderson and Simester (2004) show in two field experiments with mail-order catalogs for durable products that new customers acquired with larger discounts purchase more from future catalogs. In contrast, Lewis (2006) finds a negative effect of discount depth on future revenues from the acquired new customers for an online grocery retailer and a newspaper. Even though choosing promotion size and referral reward sizes are similar they differ conceptually. Whereas the company offers promotions to the *prospective new* customer, it offers referral rewards to *existing* customers. Put differently, with referral rewards, the new customer might not even be aware of (the size of) the referral reward. Thus, different theories apply. Our discussion in the next section will center on social ties between the referrer and the referred customer, which do not play a role for promotions.

3. Theoretical Background

A number of different theories suggest that referral reward size may have negative or positive effects on the referred new customers' profitability (see Table 3). On the one hand, larger rewards might lead to the acquisition of less profitable new customers. **Larger rewards incentivize potential referrers to exert more effort and to reach out to more potential new customers.** Thus, existing customers may also try to refer peers with whom they have weaker ties (Bampo et al. 2008), **which may negatively affect the profitability of referred new customers for several reasons.** First, homophily

suggests **that existing customers refer new customers who are similar to them** (Van den Bulte et al. 2018, Viswanathan et al. 2018). But existing customers will have less in common with their weaker ties. Therefore, the referred new customer may not be a good match for the firm and thus less profitable. Second, active matching means that existing customers actively screen their network for peers who could benefit from the firm's services the most and therefore spend more money (Van den Bulte et al. 2018). Again, this matching should be worse if existing customers have a stronger incentive to also refer weaker ties. Existing customers may use their social capital and exert more social pressure or overpromise. As a result, **referred new customers may have an inferior fit with the company and thus a lower profitability** (Lin 2002). Third, social enrichment suggests that the bond between a new customer and the firm will be stronger for referred than for nonreferred new customers because the referrer is also connected to the firm. Weaker social ties care less about the presence of their referrer and may therefore be more likely to churn. In addition, if the referrer shares the (larger) reward with the new customer, the latter effectively receives a larger acquisition incentive, which may also attract more price-sensitive and hence less profitable customers (Lewis 2006).

On the other hand, larger rewards could increase referred new customers' profitability. Active matching may become better rather than worse if **more effort of the referrer means that he or she communicates more information to potential new customers** (Van den Bulte et al. 2018). Also, referrers may be concerned about appearing greedy and **leaving a negative impression on others** (Xiao et al. 2011) and **thus select only profitable new customers.** Finally, referrers may attempt to reciprocate the generous referral reward they receive from the firm (Gouldner 1960) by finding profitable new customers.

4. Field Experiment with an Online Bank

4.1. Study Setup

To investigate the effect of referral reward size on new customer profitability, we analyze a field experiment with German customers of a major European online

Table 3. Theories for the Effect of Referral Reward Size on the Profitability of Referred New Customers

Negative effect	Positive effect
Homophily (Van den Bulte et al. 2018, Viswanathan et al. 2018)	Better active matching (Van den Bulte et al. 2018)
Worse active matching (Van den Bulte et al. 2018, Lin 2002)	Impression management (Xiao et al. 2011)
Social enrichment (Van den Bulte et al. 2018)	Reciprocity (Gouldner 1960)
Reward sharing (Lewis 2006)	

bank that has used a referral program for many years. The referral program incentivizes existing customers to acquire new customers for a call money account (a savings account that allows daily access to funds) by offering money as a referral reward. Existing customers receive a referral reward for every new customer they successfully refer.¹

In a between-subjects experiment in 2013, the bank systematically used two different referral reward sizes. The small reward (€20) is typically used by the bank and well in line with referral rewards in the industry, whereas the large reward (€50) is notably above the national industry average. To make sure that customers were aware of the referral reward program, the bank sent out mailings to existing customers in the experiment. The mailings explain the referral program and highlight the size of the reward.

We compare 107,029 existing customers who received a mailing promoting the small referral reward with 53,854 existing customers who received a mailing about the large referral reward. The bank randomly selected existing customers for the experiment who had held a call money account with the bank for at least six months prior to the experiment, had been active (i.e., carried out transactions on their accounts) but had not made a successful referral in 2013 prior to the experiment, and had a “referral score” (RS) above a certain threshold.² Given these selection criteria, participants in the experiment tend to be more profitable than the average customer of the bank. For our analysis, we focus on existing customers who had not received another mailing about the bank’s referral reward program in 2013 prior to the experiment.

Customers are comparable across the two experimental conditions (see Table 4 for descriptives and significance tests for the differences between the two groups). The only exception is gender, where joint accounts (owned by more than one person) are slightly less prevalent in the small reward condition (19.69% versus 20.22% in the large reward condition). We show in a robustness check that this small difference in gender does not affect our findings (see Appendix B).

The bank implemented the two treatment conditions in consecutive periods to avoid upsetting existing customers who received an offer for the small referral reward if they found out that other customers were offered a larger reward at the same time. Beyond fearing the potential backlash, managers were concerned that negative word of mouth could interfere with the experiment if both reward sizes were implemented simultaneously. The mailing for the small reward was sent out on May 14, 2013, and the mailing for the large reward was sent out on June 18, 2013. We record the first successful referral of each existing customer in the experiment (if he or she makes one) during a 30-day time window following the respective mailing. The two experimental periods are comparable. Neither the focal bank nor the European Central Bank adjusted interest rates during the experiment, stock market fluctuations were small, and the competitive landscape was stable. We also show with data from a different year that the periods of mid-May to mid-June and mid-June to mid-July are comparable with respect to base referral rates and the profitability of referred new customers, when reward size is constant (see Section 4.3 and Appendix A). We hence do not expect adverse effects on the validity of our experimental results.

Table 4. Descriptives for Existing Customers in the Experiment

Variable	Mean (SE)/frequency		Test for difference
	Small reward	Large reward	
<i>Customer profitability (€)^a</i>	30.80 (0.08)	30.59 (0.12)	$t = 1.53$ ($p = 0.13$)
<i>Referrals in 2012 (% yes)</i>	5.84%	5.70%	$\chi^2 = 1.25$ ($p = 0.26$)
<i>Number of logins in 2012</i>	11.88 (0.10)	11.89 (0.14)	$t = -0.09$ ($p = 0.93$)
<i>Tenure (days as customer)</i>	2,558 (4.88)	2,549 (7.26)	$t = 1.09$ ($p = 0.28$)
<i>Age (years on December 31, 2012)</i>	50.92 (0.04)	50.83 (0.05)	$t = 1.39$ ($p = 0.16$)
Gender			
<i>Female</i>	44.45%	44.03%	$\chi^2 = 6.57$ ($p = 0.04$)
<i>Male</i>	35.87%	35.75%	
Joint account	19.69%	20.22%	
<i>n</i>	107,029	53,854	

Note. SE, standard error.

^aProfit contribution from the call money account in the two quarters preceding the experiment.

4.2. Results

We first analyze how referral reward size influences the referral rate using the 160,883 existing customers in the experiment. Second, we study how reward size affects the profitability of the 237 new customers referred by these existing customers, examining the profit contribution of the new customers over their first two years with the bank. The bank determines a customer's profit contribution as a certain percentage of the customer's account balance, which is recorded at the end of each quarter. The percentage reflects interest and other income related to the account balance as well as variable costs, for example, operational costs for account maintenance and financial costs for risk management. Note that the bank does not track costs at the individual level but uses the same percentage to determine profit contribution across all customers. Like Schmitt et al. (2011), we are interested in the effect of reward size on customer profitability even before considering that larger rewards also entail higher costs. We hence do not subtract acquisition costs here but discuss the role of referral reward costs and mailing costs in Section 6.

Our experimental setup ensures that observed differences in referral rate and referred new customer profitability can be attributed only to referral reward size. Thus, we compare the dependent variables in the two conditions using χ^2 - and t -tests (a regression model with controls yields identical results; see Appendix B). We present the results for referral rate (i.e., the percentage of existing customers who have made a successful referral) and for mean new customer profitability in Table 5.

In line with the field studies by Hinz et al. (2011) and Jin and Huang (2014), we find that existing customers refer more new customers when incentivized with large (versus small) referral rewards (left column of Table 5). In our experiment, the referral rate increases by a factor of 8.5 from 0.042% to 0.357% ($\chi^2 = 240.87$, $p < 0.01$).

Our main interest is in the effect of reward size on the profitability of the referred new customers (right column of Table 5). We find a significant negative effect: the average profitability decreases by 48% from €84.46 for referred new customers in the small reward condition to €43.77 for referred new customers in the large reward condition ($t = 2.63$, $p < 0.01$).³ Thus, the negative effects discussed in Section 3 (i.e., homophily, worse active matching, social enrichment, and reward sharing) appear to dominate the positive ones (i.e., better active matching, impression management, and reciprocity).

In Figure 1, we further break down new customers into quartiles based on their profitability. The graph illustrates that large (versus small) rewards result in an increase in referred new customers across all quartiles. However, the increase among low-profitability referred new customers is larger (+1,345%) than among high-profitability customers (+380%), resulting in lower average new customer profitability in the large reward condition.

Existing customers who make a referral are very similar in both the small and large reward groups (see Appendix C). We find a significant difference only in age, with existing customers who make a referral in the large reward group being slightly older. The similarity of both groups suggests that differences in the number and profitability of referred new customers are unlikely to result from self-selection by existing customers but rather stem from changes in behavior (Schmitt et al. 2011).

4.3. Robustness Checks

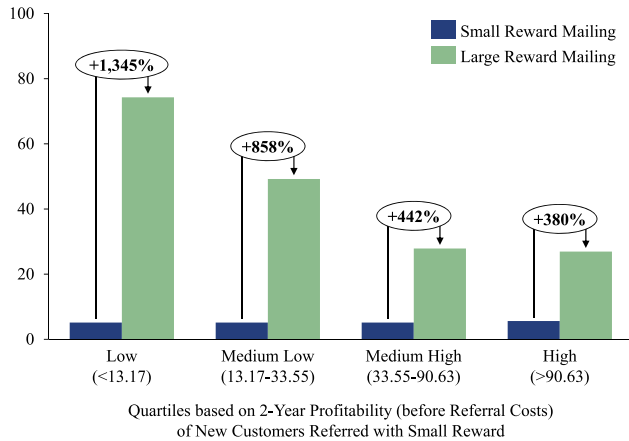
We run two robustness checks. First, we make sure that our results are not biased because the periods of mid-May to mid-June and mid-June to mid-July are different. We compare the respective periods in 2016, when referral reward size was constant (€20), and find no significant differences in the referral rate and the profitability of referred new customers ($p > 0.10$;

Table 5. Effects of Reward Size on Referral Rate and Profitability of Referred New Customers

Reward size	Referral rate ^a	Mean profitability of referred new customers (SE)
Small	0.042% (n = 107,029)	84.46 (25.03) (n = 45)
Large	0.357% (n = 53,854)	43.77 (4.72) (n = 192)

Note. SE, standard error.

^aPercentage of existing customers with a successful referral during a 30-day observation period.

Figure 1. (Color online) Number of Referred New Customers Across Quartiles of New Customer ProfitabilityNumber of Referred New Customers
per 50,000 Existing Customers

see Appendix A). If anything, the mean profitability of referred new customers is slightly lower in May/June (€50.58) than in June/July (€60.89). Thus, our finding that new customer profitability is higher with the small reward (May/June) than with the large reward (June/July) may actually be conservative.

Second, although the setup of the field experiment lets us establish the causal effect of reward size, it focuses on a specific setting where the participating existing customers have an above-average profitability and where referral reward size is communicated by mail. We test the robustness of our findings using the same time period as in the experiment but analyze all customers of the bank who did *not* receive a mailing.⁴ Specifically, we consider all existing customers of the online bank who held an active customer account on May 13, 2013 (the day before the start of the observation period), and had not received a referral reward mailing in 2013 prior to the observation period. We record the first successful referral of each existing customer.⁵

From these approximately 6 million existing customers, we observe 901 referred new customers acquired with a small reward in the 30 days after May 14, 2013, and 2,426 referred new customers acquired with a large reward in the 30 days after June 18, 2013. The group of potential referrers is the same in both conditions; hence, we observe a 2.7-fold increase in the referral rate when the bank offers the large referral reward. At the same time, referred new customers' mean profitability drops by 16%, from €65.34 with the small reward to €54.90 with the large reward ($t = 2.66, p < 0.01$). We thus confirm the findings of the field experiment among average customers without communication of referral reward size by mail.

5. Generalizability: Archival Data from a Telecommunications Service Provider

Prior research has shown that the effectiveness of referral programs may depend on the characteristics of the referred product (Armellini et al. 2015, Wolters and Gedenk 2018). We therefore test whether our findings on referral reward size also hold in a different industry.

5.1. Study Setup

We examine archival data from a German telecommunications service provider, which offered a uniform pay-per-use prepaid tariff with identical conditions for all customers. Our data set covers the 35 months from July 6, 2009, to June 4, 2012. The observation period is stable in the sense that neither the focal telecommunications service provider nor its main competitors made major tariff or price changes during that time.

The telecommunications service provider continuously offered referral rewards to all its existing customers and presented the program on its website. Customers did not receive any advertising material about the referral program. The company offered referral rewards in the form of telecommunications credit, which customers could use to call their friends, send text messages, or surf the internet.

Referral reward size varied over time, ranging from €5 to €15. According to its managers, the company used different reward sizes but did not follow a systematic approach in setting reward size.⁶ Therefore, we expect no bias from strategic firm behavior. In line with the field experiment, we analyze how reward size affects the referral rate and the profitability of referred new customers.

During the 35 months of the observation period, 25,544 out of 270,644 existing customers⁷ made at least one successful referral, with a total of 36,586 referred new customers. We estimate a multilevel negative binomial model with the number of referred new customers per existing customer per week as the dependent variable. The model captures unobserved heterogeneity across existing customers through a random intercept and thus accounts for correlated error terms (Bolker et al. 2009, Bates et al. 2015).

Second, we analyze the profitability of the referred new customers by studying 20,564 new customers who were referred by 15,512 existing customers. We consider all new customers who were referred during the first 23 months of the observation period⁸ and compare customer profitability in the first 12 months of the customer relationship to minimize potential bias from seasonal effects. The profitability of referred

new customers is the sum of all customer revenues (from calls, text messages, and internet usage) over the first 12 months after acquisition multiplied by the corresponding contribution margins. Note that our analysis also includes customers who churned within their first 12 months. In line with previous studies (Schmitt et al. 2011, Van den Bulte et al. 2018) and with our field experiment, we do not subtract acquisition costs. We estimate a multilevel linear regression model with a random intercept that varies across existing customers because several new customers can be recruited by the same existing customer, and errors thus might be correlated (Bolker et al. 2009, Bates et al. 2015).⁹

In both regression models, we control for variables that have been found to influence referral likelihood or the profitability of referred new customers in previous research (e.g., Kumar et al. 2010, Van den Bulte et al. 2018), that is, the profitability of the referrer, past referrals, gender, age, and tenure. In addition, we control for the size of new customers' sign-up bonuses, the number of nonreferred customers (as a proxy for advertising), and periodic effects (dummy variables for year-months). We present details about the models as well as variable definitions in Appendix D and descriptive statistics in Appendix E.

5.2. Results

Our findings in the banking industry replicate in the telecommunications service industry. We present model-free evidence in Table 6, where we split the weeks in our data set and compare small rewards (i.e., weeks with a reward size of €10 or less) to large rewards (i.e., weeks with a reward size greater than €10). For both groups, we compute the mean referral rate (i.e., the number of referred new customers over the number of existing customers across existing customer-week combinations times 100) and the mean profitability of referred new customers (i.e., the mean across referred new customers). In line with our field experiment, we find that with large (versus small) rewards, the referral rate is significantly higher ($\chi^2 = 1,544.80$, $p < 0.01$),

but the profitability of referred new customers is significantly lower ($t = 65.83$, $p < 0.01$).

Model results in Table 7 confirm the model-free evidence. Again, larger referral rewards are associated with significantly more successful referrals (0.155, $p < 0.01$). At the same time, offering higher rewards leads to the acquisition of less profitable new customers (-0.349 , $p < 0.05$). Our findings are robust to alternative model specifications and measures of new customer profitability (see Appendix F for details).

Effect sizes are managerially relevant: based on our models, a change from a small reward of €5 to a large reward of €15 (the extremes in our data) would approximately double the number of referred customers but decrease new customer profitability by about 15%.

6. Summary and Implications

Choosing referral reward size is essential for referral program success. Whereas previous research has focused on the effect of referral reward size on the number of referred new customers (e.g., Ryu and Feick 2007, Hinz et al. 2011), our study is the first to analyze how referral reward size affects their profitability. In a field experiment carried out with a large European bank, we find that larger rewards lead to the acquisition of more, but less profitable referred new customers. We replicate these results with a different set of bank customers and with archival data from a German telecommunications service provider.

Larger referral rewards negatively affect referred new customers' profitability, and the observed drop in customer profitability can be sizable. For the online bank, an increase in referral reward size from €20 to €50 results in a 48% drop in customer profitability. For the telecommunications service provider, the drop is smaller, but still highly relevant, at 15% as referral reward size changes from €5 to €15. Managers in both firms were surprised by the results. When assessing the effectiveness of different referral reward sizes, they had traditionally focused on referral rates only and thus overestimated the attractiveness of larger referral rewards.

Table 6. Telecommunications Service Provider: Model-Free Evidence for Weeks with Small Rewards ($\leq €10$) vs. Weeks with Large Rewards ($> €10$)

Reward size	Referral rate ^a	Mean profitability of referred new customer (SE)
Small	0.088 (n = 9,078,342)	25.975 (0.52) (n = 16,828)
Large	0.145 (n = 18,215,701)	24.018 (0.26) (n = 3,736)

Note. SE, standard error.

^aNumber of referred new customers over the number of existing customers per existing customer-week combination times 100.

Table 7. Telecommunications Service Provider: Effect of Reward Size on the Number and Profitability of Referred New Customers

Variable	Number of referred new customers	Profitability of a referred new customer
<i>Reward size</i>	0.155*** (0.026)	−0.349** (0.162)
<i>Existing customer profitability</i>	0.021*** (0.001)	0.319*** (0.010)
<i>Existing customer profitability</i> ²	−0.001*** (0.001)	−0.001*** (0.001)
<i>Tenure</i>	−0.637*** (0.018)	−1.451*** (0.511)
<i>Past referrals</i>	0.025*** (0.060)	−3.827*** (0.544)
<i>Age</i>	−0.108*** (0.001)	−0.107*** (0.019)
<i>Gender</i>	0.108*** (0.142)	0.273 (0.473)
<i>Sign-up bonus new customer</i>	0.042*** (0.007)	−0.073 (0.166)
<i>Number of nonreferred new customers</i>	−0.040** (0.014)	−0.238 (0.470)
<i>Year-month Constant</i>	Controlled for −9.322*** (1.712)	Controlled for 21.770*** (3.307)
<i>Existing customer-specific standard deviation</i>	2.336	10.76
α	1.712	
<i>Log likelihood</i>	−252,354.89	−100,524.40
<i>n</i>	27,294,043	20,564

Note. Numbers in parentheses are standard errors.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

For the online bank we study, profitability of customers acquired with small referral rewards is €84.46 during the first two years of the customer relationship. Hence, two-year customer profitability after subtracting the €20 referral reward is €64.46. If two-year profitability of customers in the large referral reward setting were also €84.46, these customers' profitability after subtracting the €50 referral reward would be €34.46, only about half as much as for customers in the small referral reward setting. Given that referral rates with large rewards are 8.5 times higher, though, the large reward would still generate more than four times as much customer equity (i.e., average two-year customer profitability after referral reward costs times the number of customers) for the bank. This assessment changes drastically if we consider that, in reality, the two-year profitability of referred new customers in the high-reward setting is only €43.77. These customers do not recoup their €50 acquisition costs during the first two years, leading to a negative two-year customer profitability after referral reward costs of −€6.23.

Even though the bank could gain 8.5 times as many customers, it is unclear whether it should really offer large rewards given the long time it takes before referred new customers start being profitable in this setting. Not surprisingly, managers of the bank in our empirical study have altered their approach to referral rewards on seeing these results.¹⁰

Our study features some limitations that provide opportunities for future research. First, we do not assess reward scrounging (Meyners et al. 2017), because we cannot differentiate between referred new customers who buy the product because they received a recommendation and those who would have become a customer even without a referral (type-two versus type-one referral, cf. Kumar et al. 2007, p. 141). Higher rewards should make both types of referrals more likely. On the one hand, they should attract more type-two referrals because larger rewards motivate referrers to convince customers with a lower probability of joining. On the other hand, they may also increase the number of type-one referrals, because more new customers are motivated to find someone to refer them when the reward is larger. Future research should study this issue empirically.

Second, we consider the profitability of new customers from the focal product only. In the case of the online bank, reward size might also affect referred new customers' risk profiles and/or cross-buying behavior. Moreover, there might be differential effects of reward size on the value of the referrer (Garnefeld et al. 2013).

Third, the field experiment contrasts a usual reward size of €20 with an increased reward size of €50, which might be perceived as a gain by customers. Results might be different if the usual reward was €50 and the bank decreased the reward to €20 (a perceived loss). Future research could investigate the dynamics of reward size changes.

Fourth, we offer several possible explanations for the negative effect of referral reward size. However, our data do not allow us to isolate the underlying processes. Further research should investigate why larger referral rewards lead to the acquisition of less profitable customers. For this purpose, it might be helpful to distinguish between the decision of existing customers to make referrals and the decision of new customers to accept them (see Wirtz and Chew 2002, Ryu and Feick 2007, Hinz et al. 2011, Wirtz et al. 2013). Also, laboratory experiments may facilitate separating the different processes.

Despite these limitations, our study adds to the literature on referral reward programs as the first empirical study to investigate the effect of reward size on referred new customers' profitability, answering calls for research in previous studies (Trusov et al. 2009, Schmitt et al. 2011, Van den Bulte et al. 2018). We look forward to future research that builds on our findings.

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Appendix A. Comparability of May and June (Online Bank)

Our field experiment is carried out in two time periods; that is, we observe successful referrals in the 30 days after the first mailing on May 14, 2013 (small reward), and the second mailing on June 18, 2013 (large reward). For our results to be valid and not confounded by seasonal effects, these two 30-day periods must be comparable in terms of the base referral rate and profitability of referred new customers (given the same referral reward size).

To assess whether this is the case, we compare the same two periods in 2016. We choose 2016 because there were no changes in the interest rate (neither for our bank nor by the European Central Bank that could have spurred competitive actions), because the bank kept the referral reward size constant (at €20), and because the bank did not send out any referral program–related mailings during the 60 days we assess in 2016.

For the analysis, we draw a random sample of 1.2 million customers who were with the bank on December 31, 2015. We observe these existing customers successfully refer 185 new customers between mid-May and mid-June 2016 and 183 new customers between mid-June and mid-July 2016 (see Table A.1). The referral rate (i.e., the percentage of existing customers who make a successful referral) is not significantly different between the two periods ($\chi^2 = 0.01$, $p = 0.92$).

Table A.1. Number of Referred New Customers and Mean Profitability of New Customers Referred in May/June vs. June/July 2016 (Small Reward, No Mailings)

	Number of referred new customers ^b		Mean profitability of referred new customers (SE) ^c	
	May/June	June/July	May/June	June/July
Existing customers ^a				
All	185	183	50.58 (5.36)	60.89 (5.86)
Top 75%	136	129	54.64 (6.42)	55.92 (6.53)
Top 50%	89	88	60.62 (8.60)	59.66 (8.26)
Top 25%	48	41	61.14 (10.14)	76.19 (14.45)

Note. SE, standard error.

^aGroups based on the profitability of existing customers at the end of 2015.

^bAll differences between the two time periods are nonsignificant (χ^2 -test, $p > 0.10$).

^cAll differences between the two time periods are nonsignificant (t -test, $p > 0.10$).

It is lower here than in our experiment (see Table 5) because existing customers did not receive a mailing in the summer of 2016.

We also find no significant difference in the profitability of referred new customers (profit contribution from the call money account in the first six quarters of a referred new customer) between the two periods (May/June: mean = 50.58, standard error (SE) = 5.36; June/July: mean = 60.89, SE = 5.86; $t = 1.30$; $p = 0.19$; see Table A.1).

Note that in the experiment, we consider existing customers with above-average profitability. Therefore, we test whether the two time periods in 2016 are still comparable when we focus on the most profitable existing customers. As shown in Table A.1, all differences remain small and insignificant. In summary, these results indicate that seasonality should not affect the outcome of our experiment.

Appendix B. Regression Analysis with Control Variables (Online Bank)

Customers in our field experiment are comparable with respect to all variables in Table 4 except gender, where the occurrence of joint accounts is slightly higher in the large reward condition. To show that our key finding does not hinge on the assumption of comparable experimental groups, we regress new customer profitability on reward size while controlling for characteristics of the 237 existing customers who made a referral in our field experiment with the online bank (Table B.1). Our finding remains stable: larger referral rewards result in the acquisition of less profitable referred new customers.

Table B.1. Linear Regression Model with Control Variables (Online Bank)

Variable	Profitability of referred new customers
Reward size	−44.641*** (15.965)
Existing customer profitability	0.219 (0.523)
Existing customer profitability ²	0.002 (0.004)
Logins	0.183 (0.179)
Tenure	−0.004 (0.004)
Past referrals	−22.635 (19.376)
Age	0.107 (0.573)
Gender: Male	−15.525 (20.729)
Gender: Female	−14.051 (21.446)
Constant	94.738** (38.917)
R ²	0.067
n	237

Note. Numbers in parentheses are standard errors.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Appendix C. Descriptives for Existing Customers Who Made a Referral (Online Bank)

Variable	Mean (SE)/frequency		Test for difference
	Small reward	Large reward	
Customer profitability (€) ^a	26.39 (4.37)	31.49 (2.06)	$t = -1.07$ ($p = 0.28$)
Referrals in 2012 (% yes)	17.78%	9.90%	$\chi^2 = 2.24$ ($p = 0.13$)
Number of logins in 2012	12.87 (3.30)	14.41 (2.70)	$t = -0.27$ ($p = 0.79$)
Tenure (days as customer)	2,434 (219.71)	2,192 (121.04)	$t = 0.89$ ($p = 0.37$)
Age (years on December 31, 2012)	46.18 (2.11)	50.09 (0.75)	$t = -2.11$ ($p = 0.04$)
Gender			
Female	42.22%	45.31%	$\chi^2 = 2.66$ ($p = 0.27$)
Male	40.00%	45.31%	
Joint account	17.78%	9.38%	
n	45	192	

Note. SE, standard error.

^aProfit contribution from the call money account in the two quarters preceding the experiment.

Appendix D. Specification of Multilevel Models
(Telecommunications Service Provider)

$P(NRNC_{it}|\mu_{it}, \alpha)$

$$= \frac{\Gamma(NRNC_{it} + \alpha^{-1})}{\Gamma(NRNC_{it} + 1)\Gamma(\alpha^{-1})} \left(\frac{\alpha^{-1}}{(\alpha^{-1} + \mu_{it})} \right)^{\alpha^{-1}} \left(\frac{\mu_{it}}{(\alpha^{-1} + \mu_{it})} \right)^{NRNC_{it}},$$

$$\mu_{it} = \exp(\beta_0 + \beta_{0i} + \beta_1 \cdot REWARD_t + \beta_2 \cdot PROFIT_EC_i + \beta_3 \cdot PROFIT_EC_i^2 + \beta_4 \cdot TENURE_{it} + \beta_5 \cdot PASTREF_{it} + \beta_6 \cdot AGE_{it} + \beta_7 \cdot MALE_i + \beta_8 \cdot SUB_t + \beta_9 \cdot NONREF_t + \beta_{10} \cdot YEARMONTH_{mt}),$$

where

$NRNC_{it}$ = number of referred new customers (number of new customers referred by existing customer i in week t),

$REWARD_t$ = reward size (referral reward size in week t , in euros),

$PROFIT_EC_i$ = existing customer profitability (profit contribution of existing customer i in his or her first 12 months of customer relationship, in euros),

$TENURE_{it}$ = tenure (one if existing customer i 's relationship with the company is longer than 3 months in week t , zero otherwise),

$PASTREF_{it}$ = past referrals (one if existing customer i has made at least one successful referral before week t , zero otherwise),

AGE_{it} = age (age of existing customer i in week t , in years),

$MALE_i$ = gender (one if existing customer i is male, zero otherwise),

SUB_t = sign-up bonus for new customer (sign-up bonus for new customers in week t , in euros),

$NONREF_t$ = number of nonreferred new customers (number of new customers who join the company without a referral in week t divided by the lowest number of nonreferred new customers in a week),

$YEARMONTH_{mt}$ = month in the observation period (one if week t is in month m and zero otherwise, with $m = 1-34$).

We estimate the following model for the profitability of referred new customers:

$$PROFIT_NC_{ij} = \gamma_0 + \gamma_1 \cdot REWARD_{ij} + \gamma_2 \cdot PROFIT_EC_i + \gamma_3 \cdot PROFIT_EC_i^2 + \gamma_4 \cdot TENURE_{ij} + \gamma_5 \cdot PASTREF_{ij} + \gamma_6 \cdot AGE_{ij} + \gamma_7 \cdot MALE_i + \gamma_8 \cdot SUB_j + \gamma_9 \cdot NONREF_j + \gamma_{10} \cdot YEARMONTH_{jm} + \delta_i + \varepsilon_{ij},$$

where

$PROFIT_NC_{ij}$ = profitability of referred new customers (profit contribution of new customer j , who was referred by referrer i , in the first 12 months of new customer j 's relationship with the company, in euros),

$REWARD_{ij}$ = reward size (size of referral reward that referrer i receives for referring new customer j , in euros),

$PROFIT_EC_i$ = existing customer profitability (profit contribution of existing customer i in his or her first 12 months of customer relationship, in euros),

$TENURE_{ij}$ = tenure (one if existing customer i 's relationship with the company is longer than three months in the week where new customer j is acquired, zero otherwise),

$PASTREF_{ij}$ = past referrals (one if existing customer i has made at least one successful referral before referring new customer j , zero otherwise),

AGE_{ij} = age (age of existing customer i in the week where new customer j was acquired, in years),

$MALE_i$ = gender (one if existing customer i is male, zero otherwise),

SUB_j = sign-up bonus for new customer (sign-up bonus for new customer j , in euros),

$NONREF_j$ = number of nonreferred new customers (number of new customers who join the company without a referral in the week in which customer j is acquired divided by the lowest number of nonreferred customers per week),

$YEARMONTH_{jm}$ = acquisition month of new customer (one if new customer j is acquired in month m , zero otherwise, with $m = 1$ –22).

Appendix E. Descriptive Statistics (Telecommunications Service Provider)

Variable	Mean (SE)	Frequency (dummy = 1)
$REWARD_t$	9.952 (0.003)	
$PROFIT_{EC_t}$	33.30 (0.091)	
$TENURE_{it}$		85.0%
$PASTREF_{it}$		4.7%
AGE_{it}	42.154 (0.002)	
$MALE_i$		56.6%
SUB_t	5.955 (0.122)	
$NONREF_t$	1.452 (0.042)	

Notes. $n = 27,294,043$ existing customer–week combinations. SE, standard error.

Appendix F. Alternative Models

(Telecommunications Service Provider)

Alternative Models for the Profitability of a New Customer

We test the robustness of the negative effect of referral reward size on referred new customer profitability by estimating two alternative models. Table F.1 shows the results. We repeat the results for our main model (see Table 7) in the left column of Table F.1 to facilitate the comparison. Both alternative models confirm that larger referral rewards decrease new customer profitability:

Model (a): Nonlinear effect of rewards size. To allow for a potential nonlinear effect of reward size on new customer profitability, we replace our metric variable of reward size with three dummy variables for the reward sizes of €5, €12, and €15, using the most frequent reward size of €10 as the reference category. The coefficients for the reward size dummies show no indication of a nonlinear effect. In addition, the Akaike information criterion (AIC) and Bayesian information criterion (BIC) are worse than in our main model. Thus, there is no evidence for a nonlinear effect of referral reward size on new customer profitability.

Model (b): Alternative profitability measure. We use an alternative measure of new customer profitability that includes acquisition costs, that is, the costs of the referral reward and fixed costs (e.g., for administration, sim card, and shipping). As expected, the negative effect of reward size becomes stronger because larger rewards now not only decrease the contribution margin of a new customer but also come with higher acquisition costs.

Alternative Models for the Number of Referred New Customers

We use alternative functional forms for modeling the effect of reward size on the number of referred new customers, that is, (a) a linear model and (b) a Poisson model. In addition, we estimate (c) a logistic regression where the dependent variable = 1 if an existing customer refers at least one new customer in a given week and 0 otherwise. Results for all three alternative model specifications confirm our finding that reward size has a positive effect on the number of referred new customers (see Table F.2).

Table F.1. Telecommunications Service Provider: Robustness Checks (Dependent Variable: Profitability of Referred New Customer)

Variable	Main model	Model (a): Nonlinear effects	Model (b): Acquisition costs
<i>Reward size</i>	−0.349** (0.162)		−0.679*** (0.162)
<i>Reward €5</i>		0.322 (1.137)	
<i>Reward €12</i>		−1.463* (0.776)	
<i>Reward €15</i>		−3.599** (1.683)	
<i>Existing customer profitability</i>	0.319*** (0.010)	0.318*** (0.010)	0.319*** (0.010)
<i>Existing customer profitability</i> ²	−0.001*** (0.000)	−0.001*** (0.000)	−0.001*** (0.000)
<i>Tenure</i>	−1.451*** (0.511)	−1.504*** (0.512)	−1.451*** (0.511)
<i>Past referrals</i>	−3.827*** (0.544)	−3.830*** (0.544)	−3.827*** (0.544)
<i>Age</i>	−0.107*** (0.019)	−0.107*** (0.019)	−0.107*** (0.019)
<i>Gender</i>	0.273 (0.473)	0.255 (0.473)	0.273 (0.473)
<i>Sign-up bonus new customer</i>	−0.073 (0.166)	−0.070 (0.166)	−0.073 (0.166)
<i>Number of nonreferred new customers</i>	−0.238 (0.470)	−0.267 (0.470)	−0.238 (0.470)
<i>Year-month</i>	Controlled for	Controlled for	Controlled for
<i>Constant</i>	21.770*** (3.307)	20.564*** (2.795)	15.770*** (3.307)
<i>Existing customer-specific standard deviation</i>	10.76	10.77	10.76
<i>Log likelihood</i>	−100,524.40	−100,522.80	−100,524.40
<i>AIC</i>	201,118.90	201,119.70	201,118.90
<i>BIC</i>	201,396.50	201,413.00	201,396.50
<i>N</i>	20,564	20,564	20,564

Notes. Numbers in parentheses are standard errors. AIC, Akaike information criterion; BIC, Bayesian information criterion.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Table F.2. Telecommunications Service Provider: Robustness Checks (Dependent Variable: Number of Referred New Customers)

Variable	Main model	Poisson model	Linear model	Logistic model
<i>Reward size</i>	0.155*** (0.026)	0.145*** (0.025)	0.0003*** (0.0000)	0.149*** (0.025)
<i>Existing customer profitability</i>	0.021*** (0.001)	0.017*** (0.000)	0.0000*** (0.0000)	0.017*** (0.0010)
<i>Existing customer profitability</i> ²	−0.000*** (0.000)	−0.000*** (0.000)	−0.0000*** (0.0000)	−0.0001*** (0.000)
<i>Tenure</i>	−0.637*** (0.018)	−0.702*** (0.015)	−0.0010*** (0.0000)	−0.718*** (0.015)
<i>Past referrals</i>	0.025*** (0.060)	0.664*** (0.015)	−0.110*** (0.0001)	1.101*** (0.014)
<i>Age</i>	−0.108*** (0.001)	−0.013*** (0.001)	−0.0000*** (0.0000)	−0.012*** (0.001)
<i>Gender</i>	0.108*** (0.142)	0.095*** (0.012)	0.0002*** (0.0000)	0.092*** (0.012)

Table F.2. (Continued)

Variable	Main model	Poisson model	Linear model	Logistic model
Sign-up bonus new customer	0.042*** (0.007)	0.042*** (0.006)	0.0001*** (0.0000)	0.043*** (0.007)
Number of nonreferred new customers	−0.040*** (0.014)	−0.033** (0.014)	−0.0000 (0.0000)	−0.051*** (0.014)
Year-month	Controlled for	Controlled for	Controlled for	Controlled for
Constant	−9.322*** (1.712)	−7.926*** (0.263)	0.00003*** (0.00004)	−7.954*** (0.269)
Existing customer-specific standard deviation	2.336	1.037	0.006	0.821
α	1.712***			
Log likelihood	−252,354	−254,307	−55,579,046	−247,681
N	27,294,043	27,294,043	27,294,043	27,294,043

Note. Numbers in parentheses are standard errors.

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$.

Endnotes

¹ For a referral to be recorded, the referred new customer must provide the account number of the referrer during the sign-up process. The bank thus observes only successful referrals and not referrals that are made but not accepted. Most new customers sign up online, but sign-ups by phone and mail are also available.

² The bank's RS reflects the likelihood that an existing customer responds to a mailing about the referral reward program by referring a new customer. The bank computed the RS using customer data from 2012, with variables corresponding to those we use as controls in Appendix B. Note that the bank chose a lower cutoff value for RS in the large (versus small) reward group when sending out its mailing. For our analysis, however, the bank selected only the large reward customers who pass the same RS threshold as in the small reward condition. We hence have comparable groups.

³ The difference in customer profitability is also significant when we use the more conservative nonparametric Wilcoxon rank-sum (Mann-Whitney) test ($z = 2.69$, $p = 0.01$). In the regression analysis in Appendix B, we find no outliers with Cook's distance greater than 1 (Chatterjee and Hadi 1988); that is, no pair of a referred new customer and the existing customer who referred him or her is so different from the other customer pairs that it significantly influences the regression results.

⁴ Customers could learn about the referral reward program on the bank's web page. The web page was not personalized, so all consumers were exposed to a prominent link to the referral reward program on visiting the bank's website (e.g., to log into their accounts).

⁵ We exclude 24 customers who made a referral in the small and large reward conditions. Including them does not change the results; the difference between the small and large rewards remains significant ($t = 2.60$, $p < 0.01$).

⁶ The company did not offer different reward sizes to more or less promising existing customers; in fact, it had not even tried to identify such customer groups. The company varied reward size over time in a nonstrategic and nonpredictable fashion. For example, it offered a higher referral reward to celebrate a company "birthday" but did not repeat this the next year.

⁷ We exclude existing customers with missing data caused by technical difficulties with the company's database. (There is no indication of systematic data omission.)

⁸ We use only 23 months so that we can observe all referred customers' transactions for at least 12 months to compute their profitability.

⁹ Because 78% of existing customers refer only one new customer, a fixed-effects model is not meaningful.

¹⁰ Note that when we also consider the costs of the mailing, the company makes a loss of −€0.40 per existing customer mailed with the small reward and of −€0.45 with the large reward. These losses are driven mainly by postage charges of €0.42. The bank has realized this and has used email since, where the variable cost is zero.

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