

NorthWind Corp

Analysis of Discount Effect on Order Behavior

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Effect on Product Quantity Ordered

Given a discount, it is shown with statistical significance that a customer orders relatively more quantities of products than customers not discounted.

With a Cohen's D measure of 0.322, the effect size can be considered “small” but is not insignificant.

Overall, given a discount, on average, **a customer orders roughly 1.24 times as many products as non-discounted customers.**



Discount rate makes a difference!

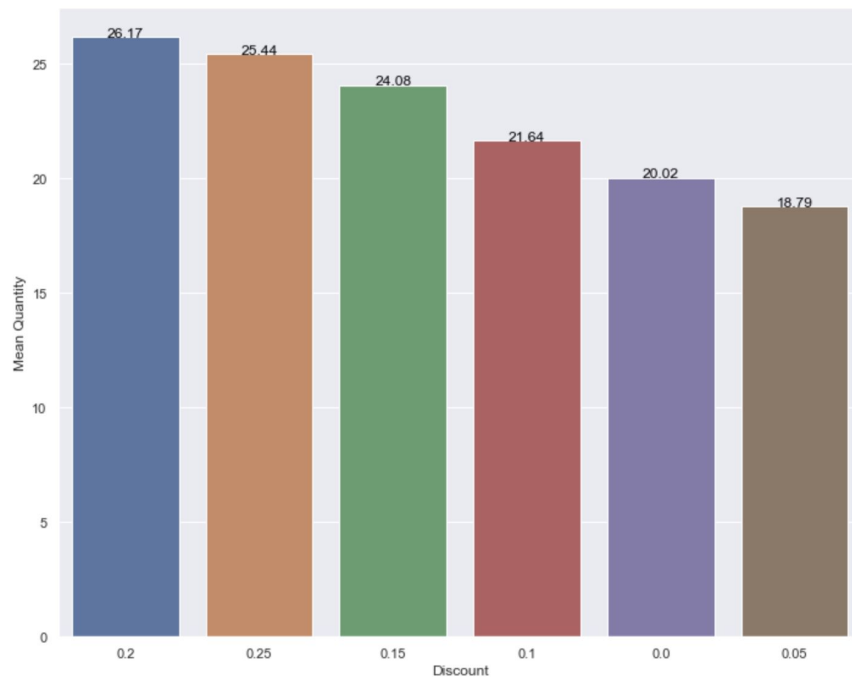
CAVEAT:

- 108 out of 2155 initial observations contained “dirty” outlier data that were well above or below 1st and 3rd quartiles that lead to misleading results.
- Those observations were dropped from the study and the remaining results are statistically based on cleaned data.
- Discount rates 1%, 2%, 3%, 4%, and 6% had so few observations that they lead to misleading results and were therefore dropped from consideration. *Results are therefore inconclusive about their efficacy.*

1. A 20% discount rate is the most effective: **customers receiving a 20% discount ordered roughly 1.33 times as many products as customers not receiving a discount.**
2. Discounts having a less but still positive effect, ordered by efficacy, are: 25%, 15%, and 10%.
3. **A discount rate of 5% has a negative effect, resulting in a quantity ratio (DECREASE) of 0.94 products ordered, compared to customers not receiving a discount.** *RECOMMEND DISCONTINUING THE USE OF 5% DISCOUNT RATE.*



Visualization of Discount effect on product quantities ordered





Offering a discount does not appear to lead to an overt increase in revenue

There is no statistical evidence to suggest that offering a discount results in customers spending more in the same order in which they received that discount.

So... does this mean it is pointless to conduct a discount campaign?

This result prompted a sub-study to determine a discount campaign's efficacy in promoting repeat/future business.

The result of that study is...



Offering a discount increases future order rate

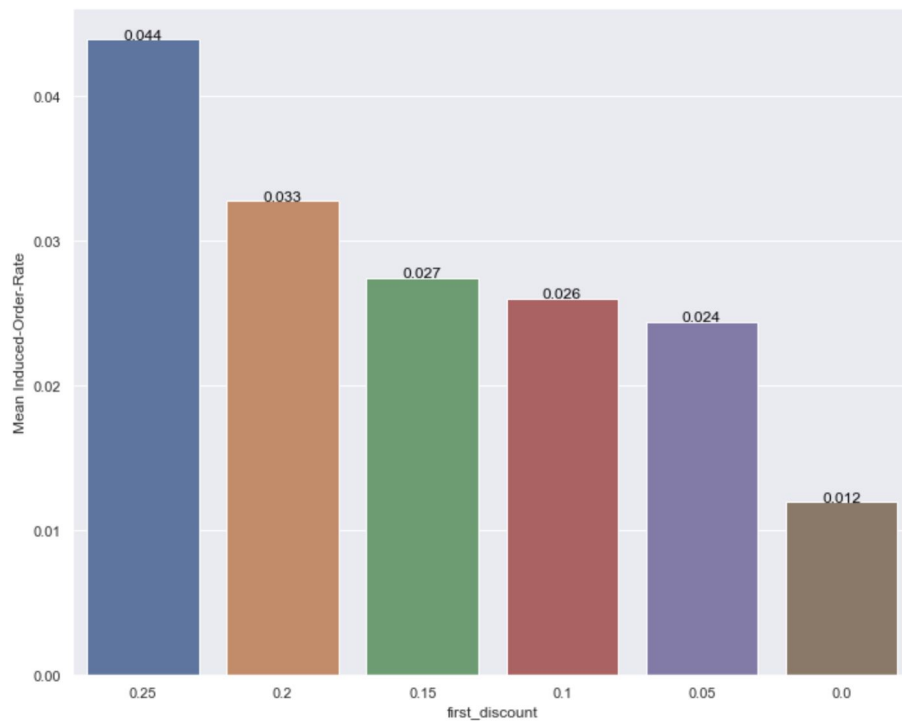
The study focuses on the order rates of customers AFTER receiving a discount, compared to the order rates of customers never discounted.

The study shows with statistical significance that customers in the former category place orders at roughly 2.52 times the rate that customers never receiving a discount do. Said differently, **AFTER receiving a discount, a customer is roughly 252% more likely to place another order, overall, when compared to customers never receiving a discount.**

This includes even subsequent non-discounted orders. **After receiving a discount, a customer is roughly 133% more likely to place a non-discounted order when compared to customers never receiving a discount of any kind.**



Visualization of Discount effect on induced/future order rate





Conclusion: Executing a discount campaign presents a strong business case

1. Discounts DO have a statistically significant effect on the quantity of a product ordered: **on average, a customer given a discount orders 1.24 times as many products as a non-discounted customer.**
2. On average, a 20% discount INCREASES the *Quantity* of ordered products the most: **customers receiving a 20% discount ordered 1.33 times as many products as customers not receiving a discount.**
3. On average, a **5% discount DECREASES the *Quantity of ordered products*!** That is, customers receiving a 5% discount, ordered only 0.94 times as many products as customers never receiving a discount. RECOMMEND DISCONTINUING THE USE OF 5% DISCOUNTS.
4. Discount rates 1%, 2%, 3%, 4%, and 6% had so few observations that they lead to misleading results and were therefore dropped from consideration. *Results are therefore inconclusive about their efficacy.*
5. **After receiving a discount rate of any kind, a customer tends to order more frequently** (compared to customers never receiving a discount). Thus, since **discounting an order promotes an increased order rate in the future, revenue gains may be realized longer-term and looks to have an impact on customer retention as a function of term order-rate**
6. **In general, customers receiving a discount order roughly 2.52 times as often (than customers never receiving a discount), on average, after receiving a discount.**
7. **For non-discounted orders following a discount, customers STILL place NON-DISCOUNTED orders roughly 1.33 times as often as customers never discounted.**



Future Work

1. Create visualizations to demonstrate general consistency/regularity of order-rate induced post-discount. That is, show these trend(s) graphically.
2. Investigate if there is a significant relationship between **OrderRate** and **CustomerDemographic** in order to devise an ad campaign to further revenue gains.
3. Investigate if there is a significant relationship between **OrderSubtotal** (revenue) and **ShippingRate** to flush out whether an in-house shipping fleet vs. third-party shipping is a worthy investment.

THANK YOU FOR YOUR ATTENTION!