



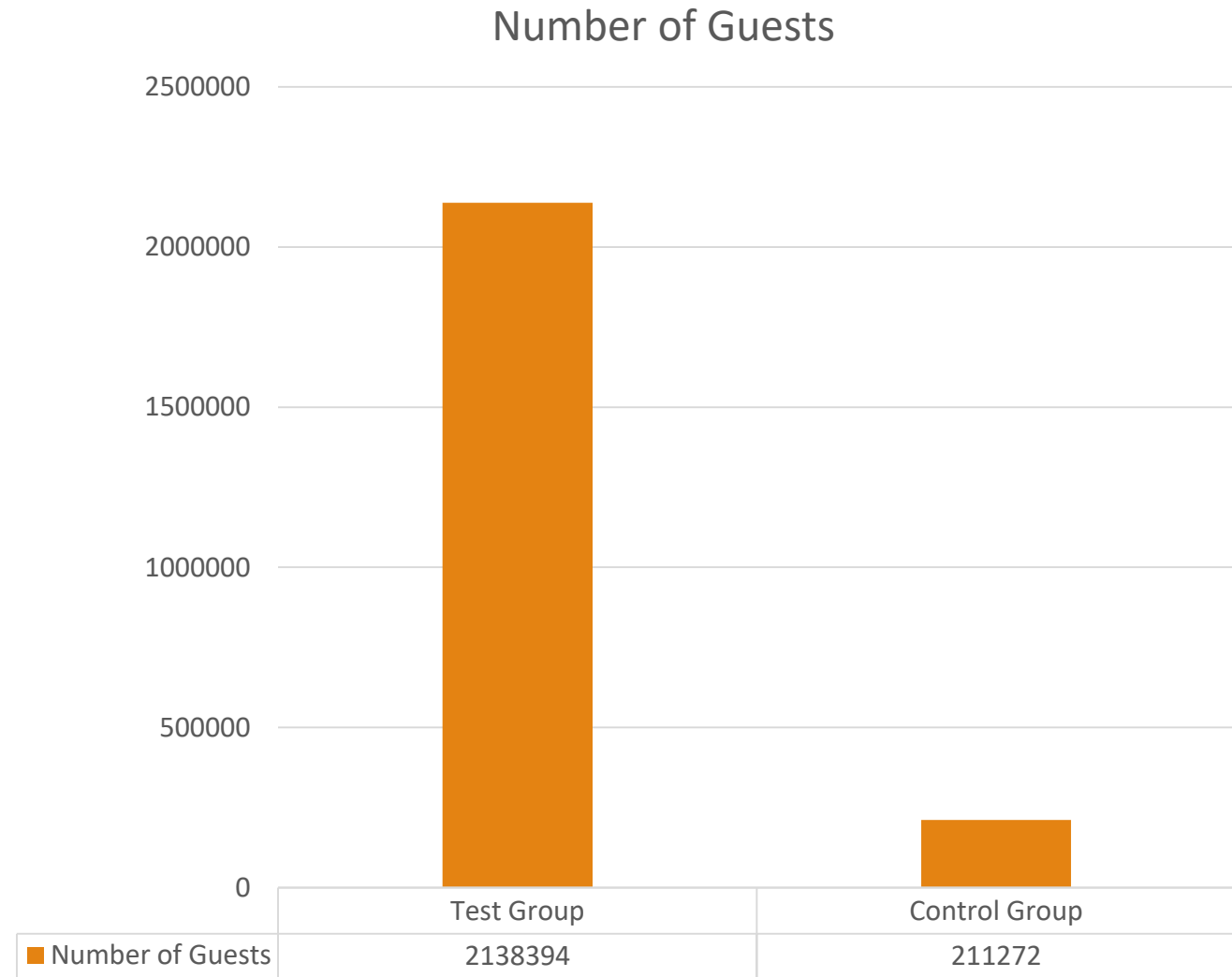
CRM Case study

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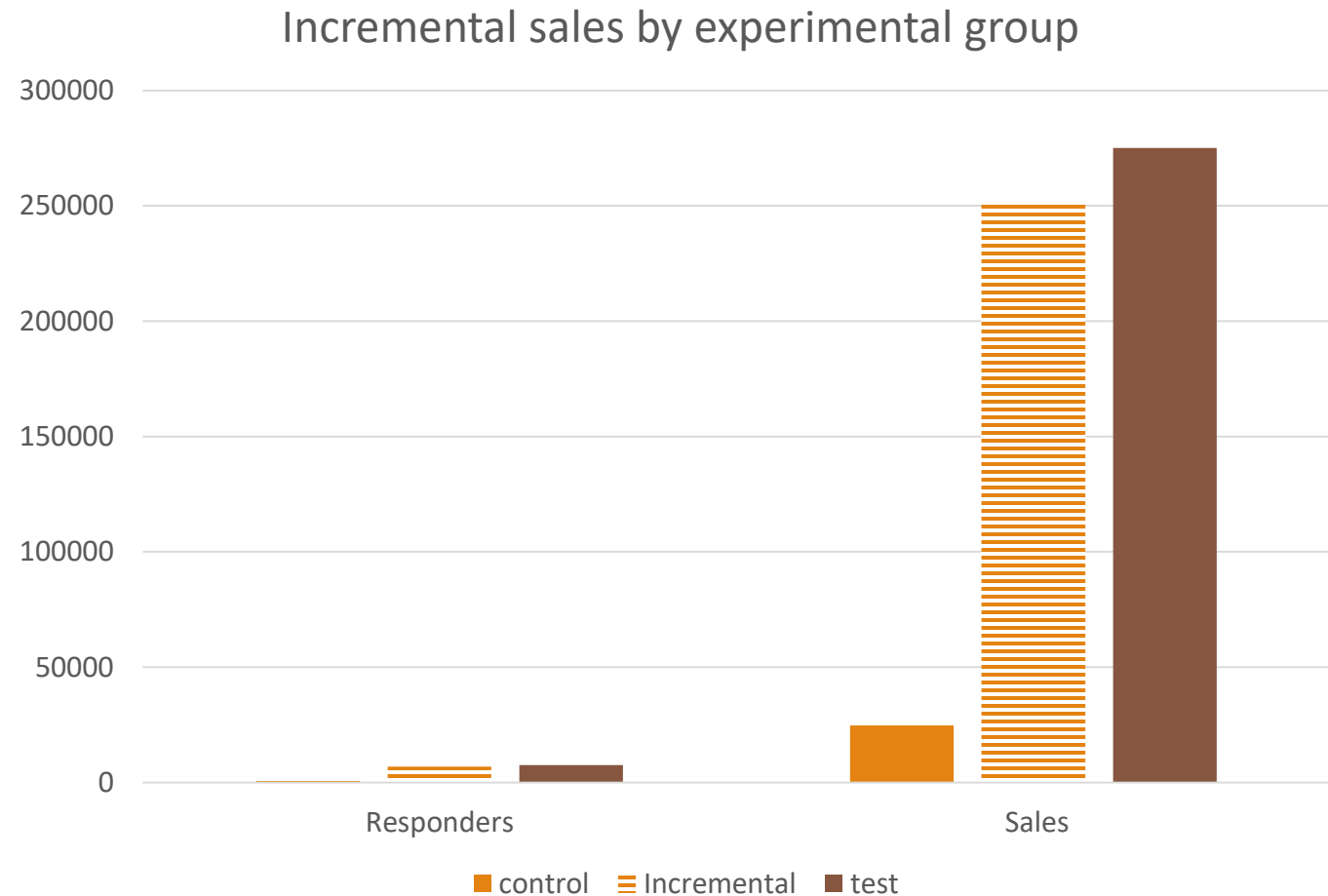
How many customers are in test vs control?

How could these counts impact measurement?



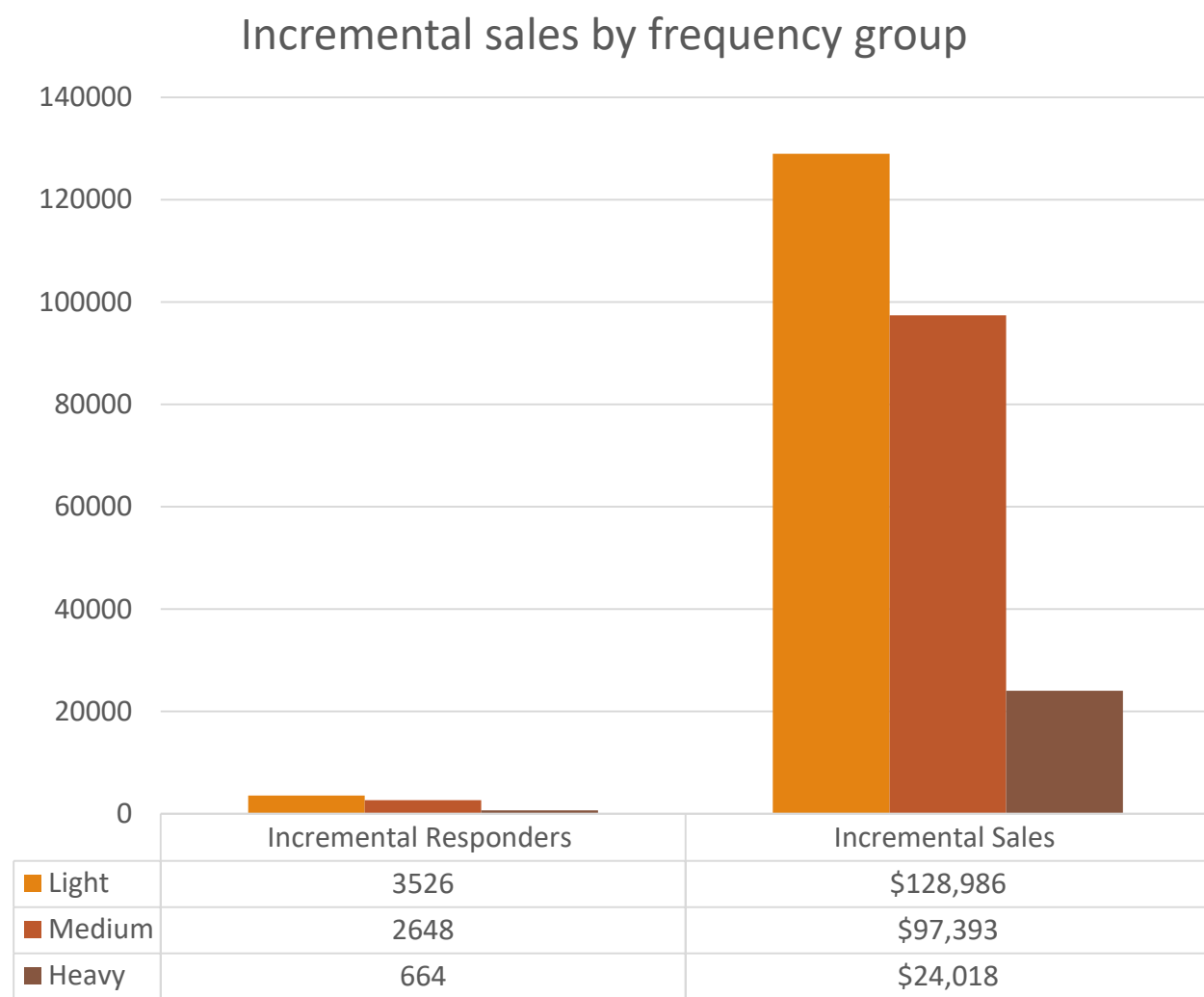
- The numbers of test customers are 10X the number of the control customer.
- These may cause imbalance and bias in comparing the incremental factors.

So, instead looking at the total difference, we compare the average of two groups.



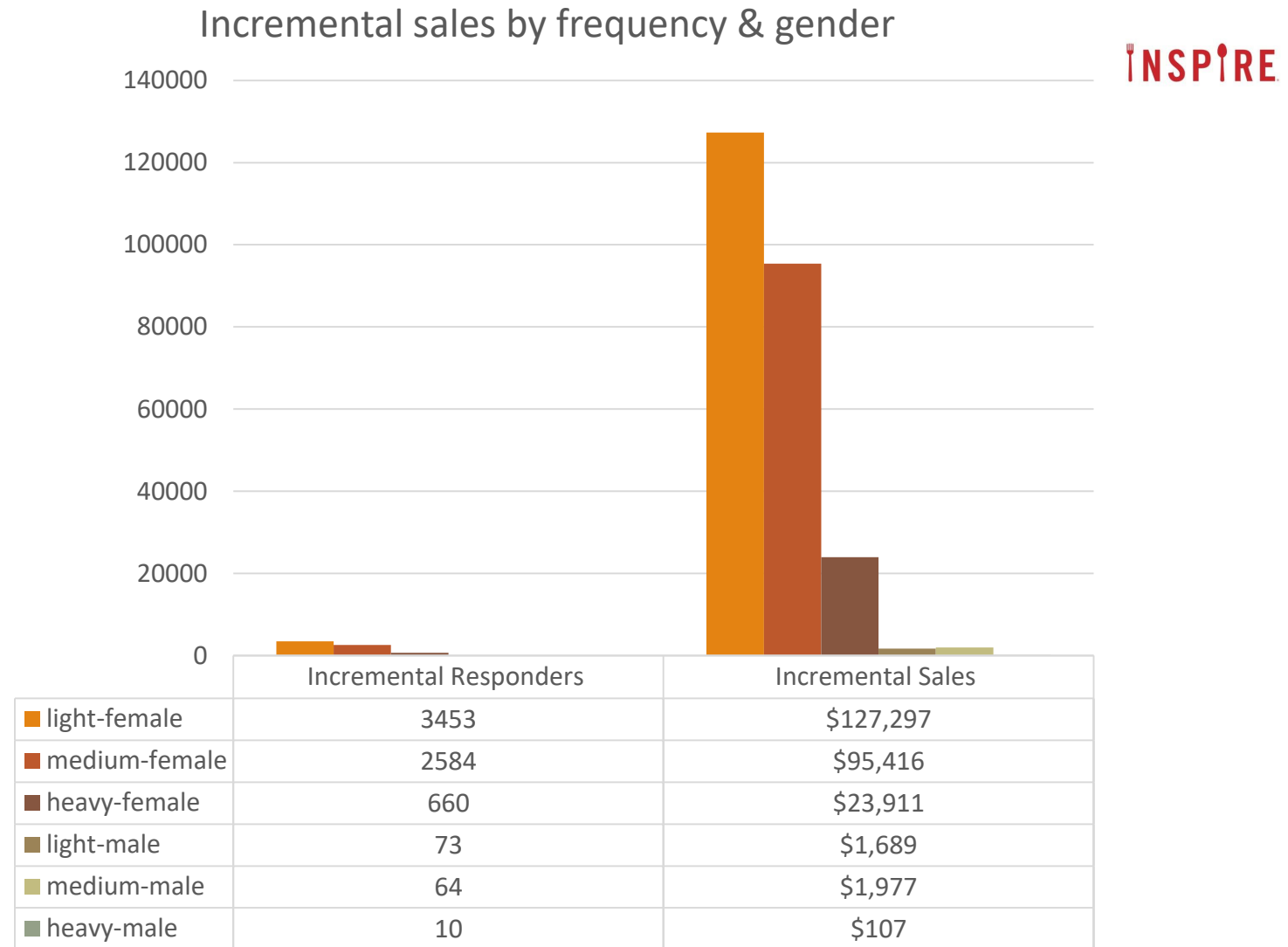
- In total, the incremental responders went up by 6838 person.
- In total, the incremental sales went up by \$250,396.

Looking by frequency, how many incremental responders and incremental sales did the coupon drive? Which frequency group performs best?



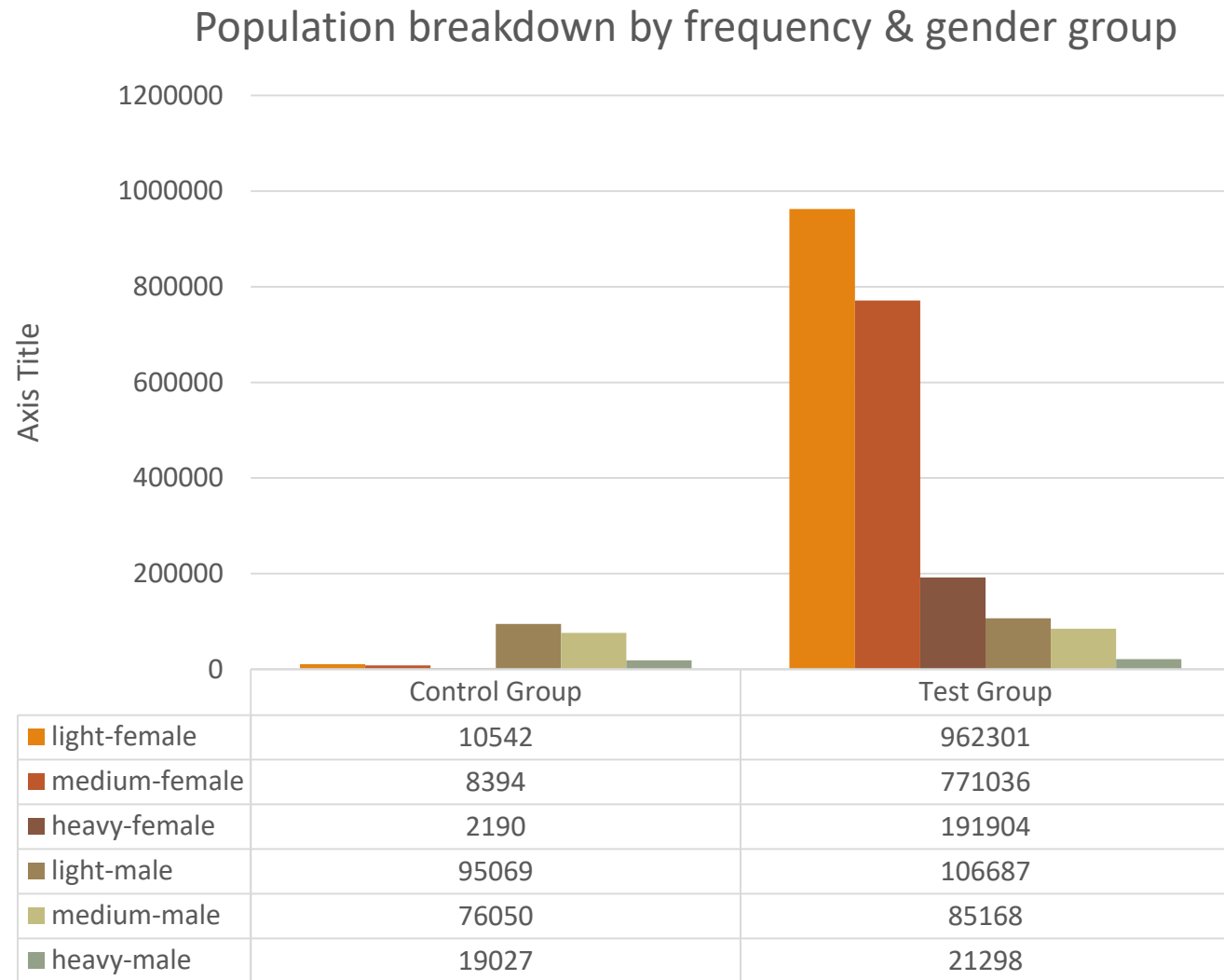
- Above figure shows the incremental responders and sales breakdown by different frequency group.
- Light frequency group performs the best. It has the most incremental responders and sales among three groups.

Looking by gender & frequency group, how many incremental responders and incremental sales did the coupon drive?
Which gender & frequency group performs best?



- There is a difference for incremental responders and sales among gender. The coupon seems to be more effective for female customers.
- Light-female group performs the best with the most incremental responders and sales.

What bias may exist in any of the results provided?



- However, if we consider the population distribution, we may find that there is a huge number difference in the population of test and control group. For example, the population difference of light-female group among the control and test group is largest.
- It's hard to tell the incremental difference is brought by the coupon effect itself, or caused by the population difference between control and test group.

Another approach

So, instead of looking at the total difference, we compare the average of different groups.

This allows us to better understand the incremental difference brought by coupon in the total population distribution.



Test vs Control

	Response Rate	Average Sales
Control Group	0.30%	\$0.12
Test Group	0.40%	\$0.13
Difference	0.10%	\$0.01
P-value	0.001*	0.043*

- Both the average response rate and sales went up for test group.
- After conducting T-Test comparing the average of two groups, we are confident to say that our coupon has a significant difference for incremental responders and incremental sales. ($p < 0.05^*$)

Comparing the average among frequency groups

	Frequency	Response Rate	Average Sales
Control	light	0.30%	\$ 0.11
	medium	0.32%	\$ 0.12
	heavy	0.33%	\$ 0.13
Test	light	0.36%	\$ 0.13
	medium	0.34%	\$ 0.13
	heavy	0.34%	\$ 0.13

- Intuitively, the incremental average response rate and sales in light user group is higher than other frequency groups.
- However, after running ANOVA test, there is no significant difference of among different frequency groups ($p=0.168$). So we can't say that coupon works better for one group than other groups.

Comparing the average among frequency & gender group

	Gender	Frequency	Response Rate	Average Sales
Control	Female	light	0.22%	\$ 0.08
		medium	0.37%	\$ 0.15
		heavy	0.32%	\$ 0.11
	Male	light	0.30%	\$ 0.11
		medium	0.31%	\$ 0.12
		heavy	0.34%	\$ 0.13
Test	Female	light	0.36%	\$ 0.13
		medium	0.34%	\$ 0.13
		heavy	0.35%	\$ 0.13
	Male	light	0.34%	\$ 0.12
		medium	0.35%	\$ 0.13
		heavy	0.32%	\$ 0.12

- Comparing the average response rate and sales, it seems that light female user is the most sensitive group to coupon. The average response rate went up from 0.22% to 0.36%, and the average sales went up from \$0.08 to \$0.13. But statistically there is no strong evidence. (p=0.618)

Take away

- ❖ Most of the brand customers are female.
- ❖ The coupon is **effective** for both incremental responders and sales.
- ❖ The effectiveness of coupon has **no significant difference** among different frequency and gender groups.

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