Effects of Advertising campaigns on Humana customers

- Megha Syam Gutti
- Aashesh Vontivillu Nareshchand
- Sai Pratheek Banda

Humana Inc. is a for-profit American health insurance company based in Louisville, Kentucky.

Humana had over 13 million customers in the U.S., reported a 2013 revenue of US$41.3 billion

The Health Insurance Company: **Humana Inc**

DATASET

- This is a panel data with data captured over two time periods, 2014 and 2015 for each county
- Data comprises of Expenditure in various marketing campaigns.
- HMO, PPO plans of the company and its competitors
- Dependent Variable: Change in Customers for a year

HMO -Health Maintenance Organization*

PPO -Preferred Provider Organization*

Issues encountered

- This is an Unbalanced Panel Data, the number of time periods (year: 2014, 2015) is not same for all cross-sectional data (ID).
- So, ID's with missing time periods are identified and omitted from the dataset to make the panel data balanced.
- Python is used to clean the data and write the cleaned data to a 'CSV' file, for us to do our further analysis.

```python
import pandas as pd
df = pd.read_csv('humana.csv')
print(df)

null_data = df[df.isnull().any(axis=1)]

df1= pd.DataFrame(null_data)

pd.options.display.max_rows = 1500
# print(df1['id'])
a = pd.DataFrame(df1['id'])

df1.to_excel("output.xlsx")

pd.dataframe(df1['id'])

a_list = a['id'].tolist()

cleaned_df = df[df['id'].isin(a_list) == False]

cleaned_df.to_csv('cleaned_df.csv')
```

Model

- Since this is a panel data, fixed effects model is used to estimate the parameters.

Why pooled OLS cannot be used here?

- Does not account for the structure of panel data
- OLS Assumption is violated – Correlation of dependent variable with error term is not zero.

- SAS is used to run the model.

```
data econ;
set WORK.cleaned;
run;

proc panel data=econ;
id id year;
model ttl_member_cnt_change2 = zillow_housing_value
TTL_ELIGIBLE
national_tv_brand_01_07
pi_humana
humana_count_hmo_plans
humana_count_ppo_plans
pi_competitors
tot_num_competitor_hmo_plans
tot_num_competitor_ppo_plans
HUM_CNTY_MA_MAPD
digital_sem
dm
drtv_longform
drtv_shortform
local_print
local_tv
national_tv_product
outdoor
radio
```

Results

Parameter Estimates						
Variable	DF	Estimate	Standard Error	t Value	Pr > |t|	Label
Intercept	1	-1262.52	522.9	-2.41	0.0158	Intercept
zillow_housing_value	1	0.005436	0.00112	4.85	<.0001	zillow_housing_value
TTL_ELIGIBLE	1	0.105721	0.00900	11.75	<.0001	TTL_ELIGIBLE
national_tv_brand_01_07	1	0.088093	0.00618	14.27	<.0001	national_tv_brand_01_07
pi_humana	1	-14.7193	6.8129	-2.16	0.0308	pi_humana
humana_count_hmo_plans	1	115.1954	38.2955	3.01	0.0026	humana_count_hmo_plans
humana_count_ppo_plans	1	-131.091	16.9932	-7.71	<.0001	humana_count_ppo_plans
pi_competitors	1	-63.7664	7.8792	-8.09	<.0001	pi_competitors
tot_num_competitor_hmo_plans	1	-132.027	25.1801	-5.24	<.0001	tot_num_competitor_hmo_plans
tot_num_competitor_ppo_plans	1	-61.4442	19.0441	-3.23	0.0013	tot_num_competitor_ppo_plans
HUM_CNTY_MA_MAPD	1	-1.09913	0.0181	-60.68	<.0001	HUM_CNTY_MA_MAPD
digital_sem	1	-0.14537	0.00997	-14.58	<.0001	digital_sem
dm	1	0.043601	0.00253	17.26	<.0001	dm
drtv_longform	1	0.093396	0.00978	9.55	<.0001	drtv_longform
drtv_shortform	1	0.033538	0.00853	3.93	<.0001	drtv_shortform
local_print	1	0.013739	0.00275	5.00	<.0001	local_print
local_tv	1	-0.01125	0.00612	-1.84	0.0658	local_tv
national_tv_product	1	0.12099	0.0245	4.93	<.0001	national_tv_product
outdoor	1	0.148685	0.0266	5.58	<.0001	outdoor
radio	1	0.066353	0.0593	1.12	0.2636	radio
national_tv_brand	1	0.039769	0.00885	4.49	<.0001	national_tv_brand

Interpretations' of each Independent Variable

- **Zillow_housing_value**

For every $1000 increase in the Zillow housing value in a county, an average of 5 customers are increased in that county.

- **TTL_ELIGIBLE**

An increase of 10 customers in Medicare insurance holders will result in 1 customer increase.

- **national_tv_brand_01_07**

An increase of $12.5 spent on national brand tv from months 1st to 8th will result in 1 customer increase.

- **pi_humana**

One-point increase in purchase intent from humana (scaled from 1-7, 1 being highest) will result in a decrease of 15 customers.

- **humana_count_hmo_plans**

One unit increase in humana_count_hmo_plans will result in 115 customers increase.

- **humana_count_ppo_plans**

One unit increase in **humana_count_ppo_plans** will result in 113 customers decrease.

Interpretations' Cont.

- **pi_competitors**

One-point increase in purchase intent from HUMANA competitors will result in a decrease of 64 customers.

- **tot_num_competitor_hmo_plans**

One unit increase in **tot_num_competitor_hmo_plans** will result in 132 customers decrease.

- **tot_num_competitor_ppo_plans**

One unit increase in **tot_num_competitor_ppo_plans** will result in 61 customers decrease.

- **HUM_CNTY_MA_MAPD**

One customer increase in humana medicare customers will result in 1 customer decrease on an average.

Interpretations' Cont.

- **Digital SEM (Search Engine Marketing)**

An increase of $100 spent on digital marketing SEM will result in 14 customer decrease on an average.

- **Direct Mails**

An increase of $100 spent on direct mails will result in 4 customer increase on an average.

- **Direct Response TV longform**

For every 100$ increase in the spending of direct response tv longform, the average number of customers increases by 9 approx.

- **Direct Response TV shortform**

For every 100$ increase in the spending of direct response tv shortform, the average number of customers increases by 3 approx.

- **Local_print**

For every 100$ increase in the spending of local print, the average number of customers increases by 1 approx.

- **Local_tv**

The spending on local tv is not a significant factor in deciding the number of humana customers

Interpretations' Cont.

national_tv_brand

For every 100$ increase in the spending on marketing the tv brand, the average number of customers increases by 4 approx.

Outdoor

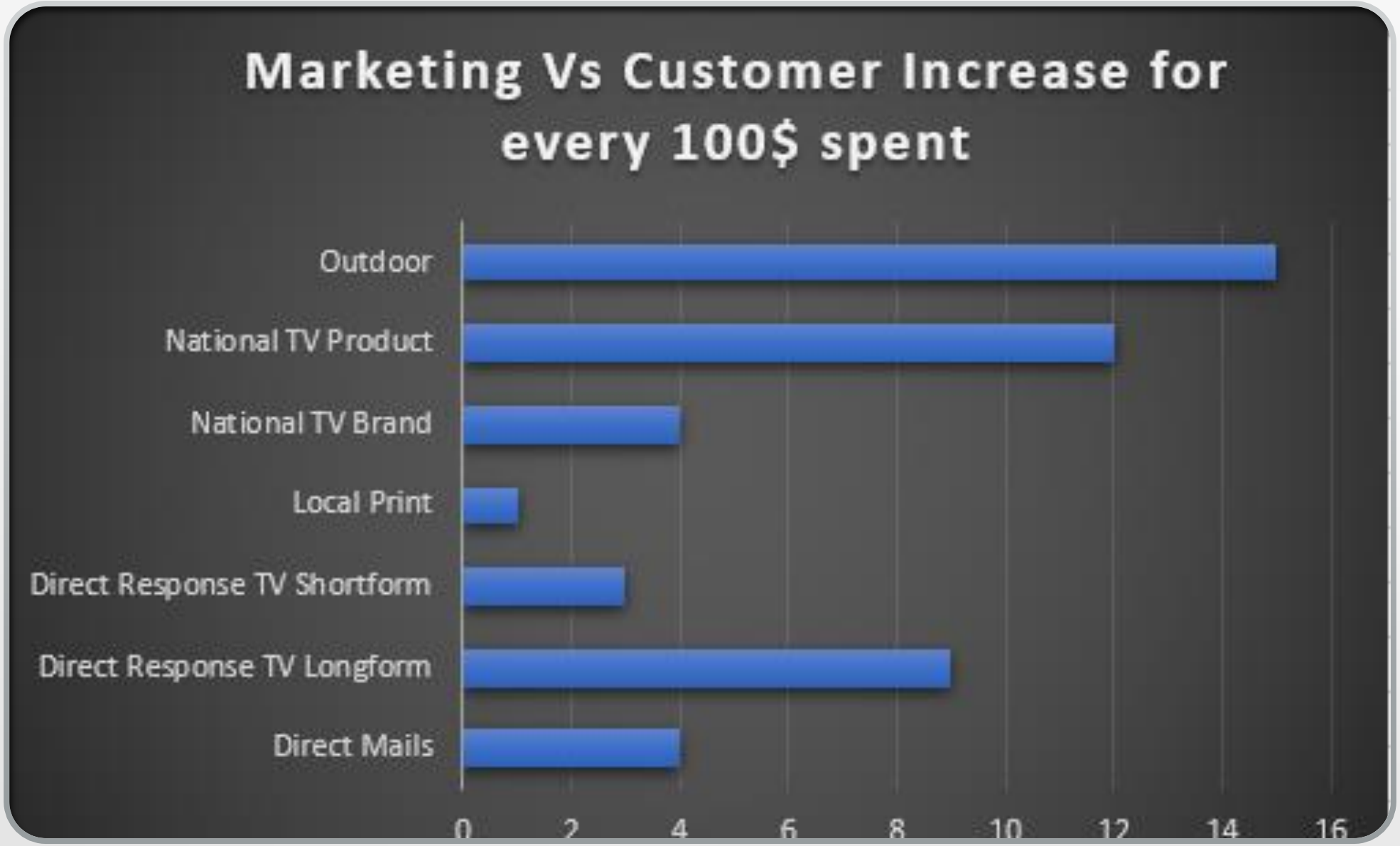
For every 100$ increase in the spending of outdoor marketing, the average number of customers increases by 15 approx.

Radio

The spending on radio is not a significant factor in deciding the number of humana customers

national_tv_product

For every 100$ increase in the spending on marketing the tv product, the average number of customers increases by 12.


Marketing Vs Customer Increase for every 100$ spent
Outdoor
National TV Product
National TV Brand
Local Print
Direct Response TV Shortform
Direct Response TV Longform
Direct Mails
0
2
4
6
8
10
12
14
16

Recommendations

- The impact caused by tv longform advertising is more than that of tv shortform advertising
- Spending on marketing campaigns should be more focused on Outdoor and National TV Product
- Digital Search Engine Marketing has a negative impact on the Humana customers.
- Local TV and Radio marketing have no significant impact on the Humana customers

Thank you