

OCTOBER 2018



UNIVERSITY CO-OP DIGITAL MARKETING CUSTOMER RESPONSE

Predicting Customer Email Response Based on Customer and Email Attributes

GROUP D

SERENA DU, VINCENT KUO, CLAY MASON, RULAN PAN, CUITING ZHONG

MSBA – Marketing Analytics I

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- Objective
- Background
- Exploratory Data Analysis
- Models and Solutions
- Conclusion and Lessons Learned

Objective

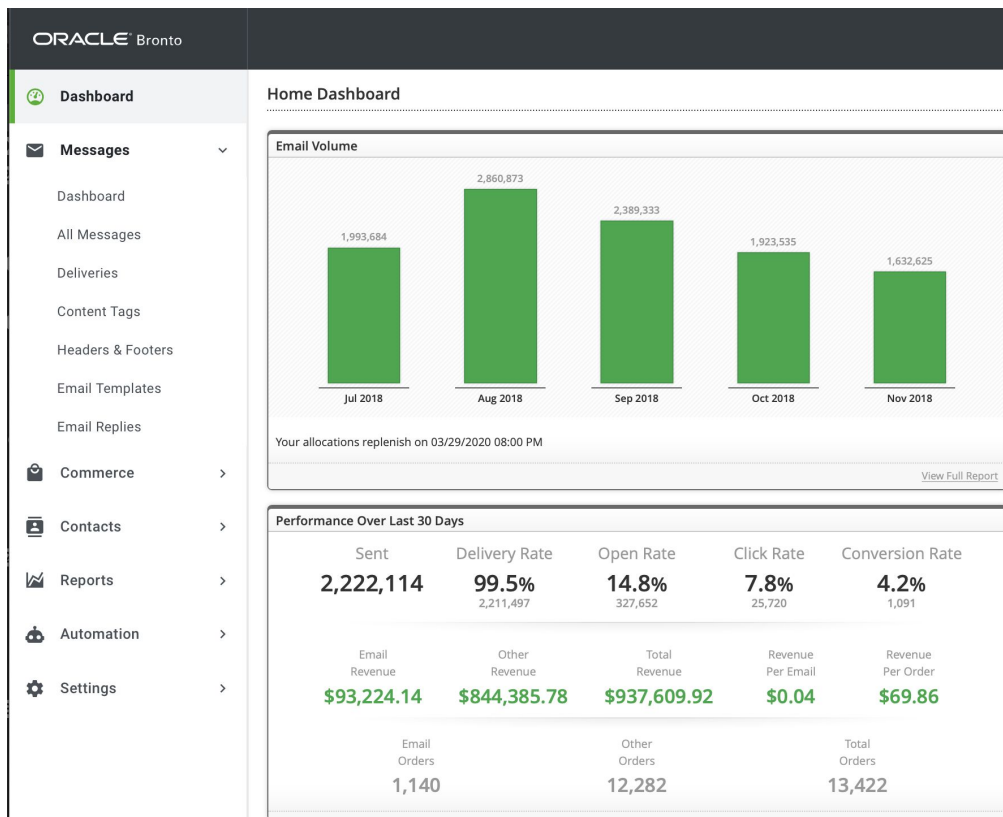
To predict customer email response rates based on customer and email attributes **and to identify the most profitable and responsive customers** in order to segment and target customers more efficiently.

Background Info & Data Sources

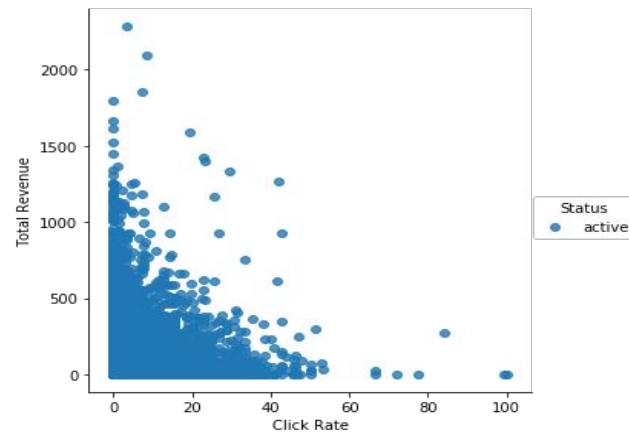
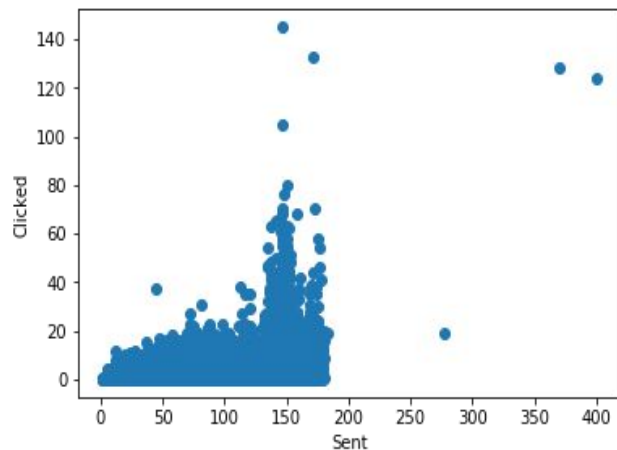
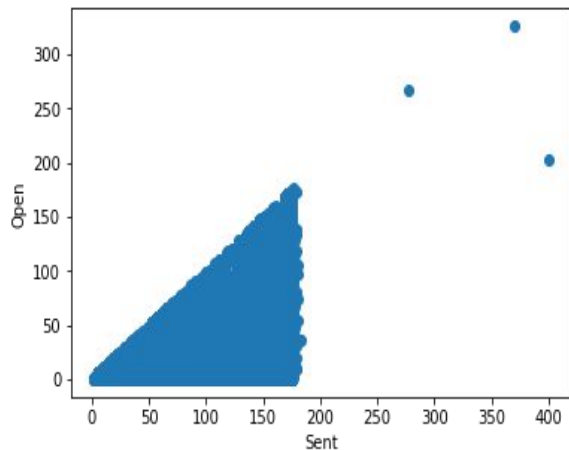
- **Co-Op Merchandise Sales**
 - **Highly Seasonal Sales:** \$40k on non-game days and \$400k on game days with peak Back-To-School revenues in August
 - 45% Textbooks and 55% General Merchandise
- **Leslie Smith**, VP of Marketing, University Co-Op
 - Sends Email Blasts to 90-100k people without utilizing any form of customer segmentation
 - **Primary Goal: segment customers to customize marketing campaigns** based on customer attributes such historical product purchases, email campaign response rates, demographics, coupon/discount usage, etc.
- **Oracle Bronto – Customer Relationship Management and Digital Marketing Platform**
 - New CRM (7 months of data) that maintains distribution lists and email campaign performance
 - Tracks Customer Email Engagement with Clicks and Website Sales Conversions
 - 46 million emails annually (15 million actually sent over 7 months)
- **Oracle - Sales Transactions**
 - Purchase History for Customers
 - Not linked to Branto, but exports can be linked with common fields

Real World Data!

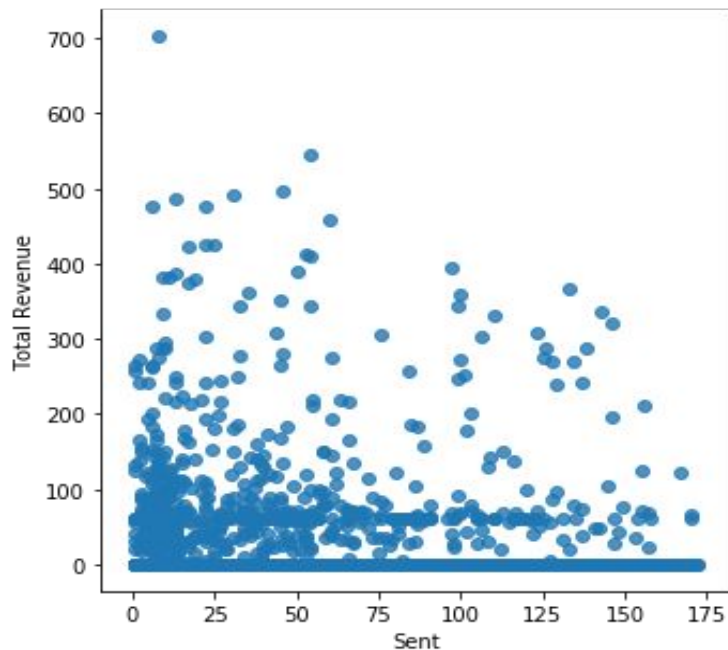
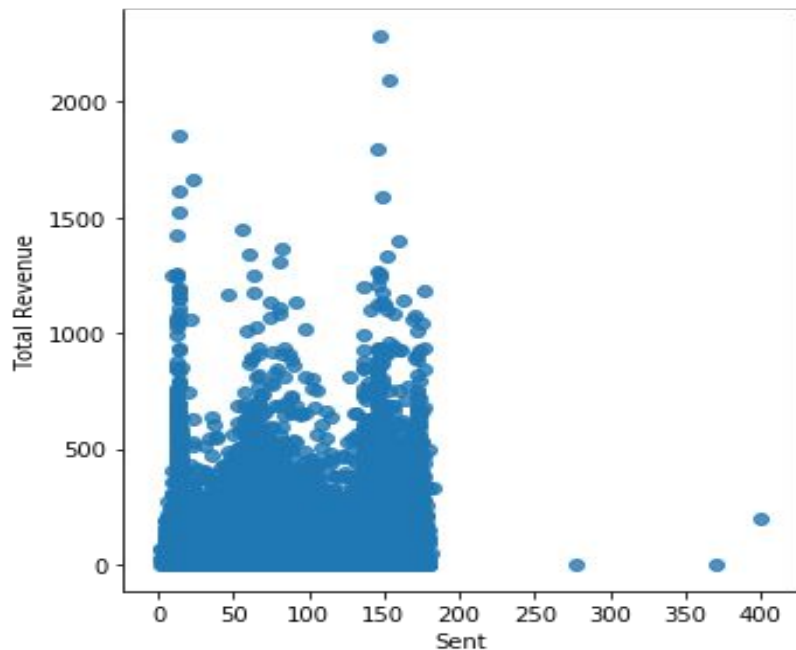
- **109,000 Customers**
- **77 Features on Customers**
 - Purchase history
 - Sports fan or not
 - Demographic information
 - Geographic information
 - Email campaign target



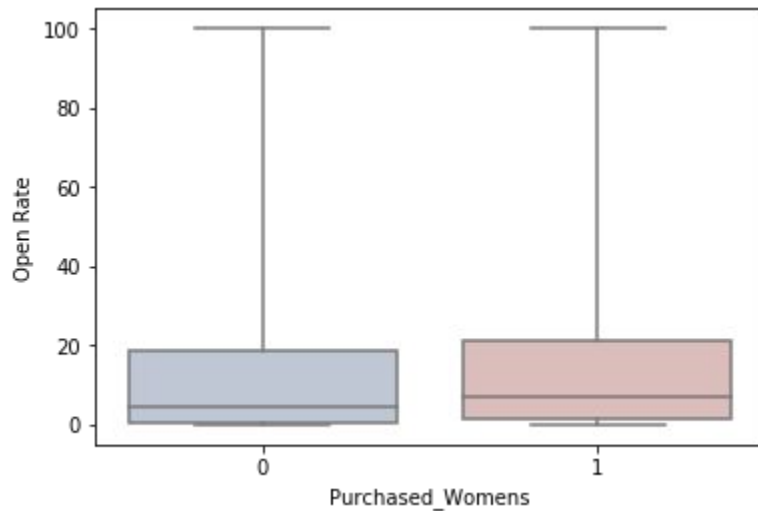
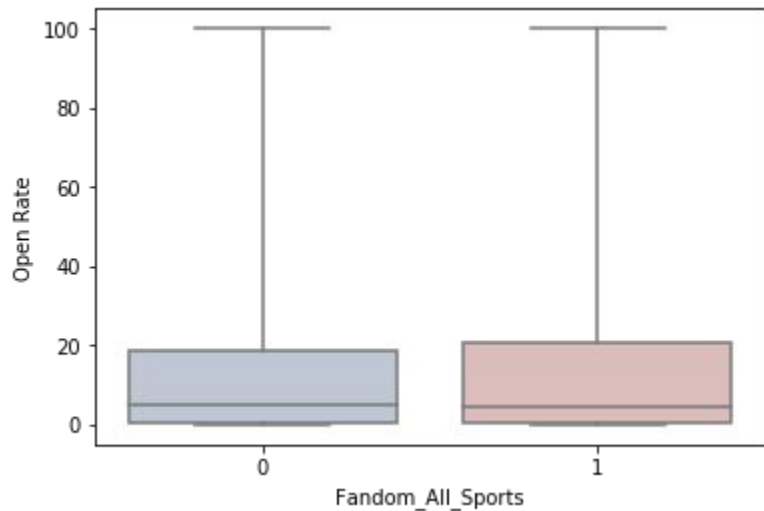
How do current email campaigns perform?



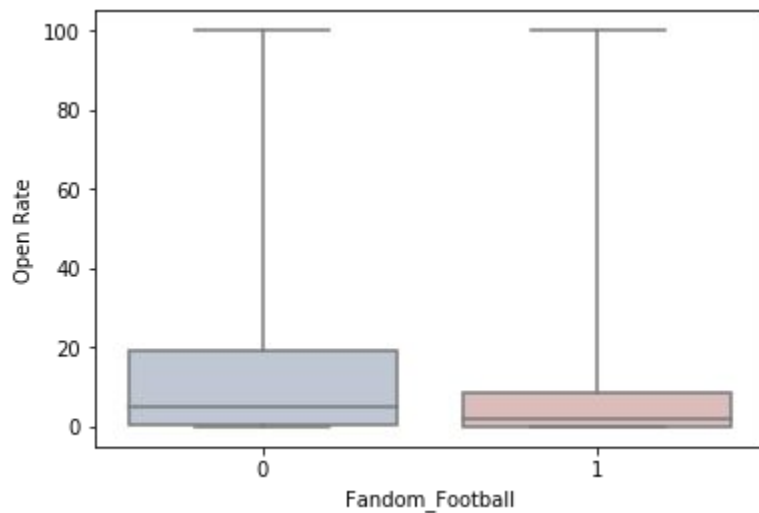
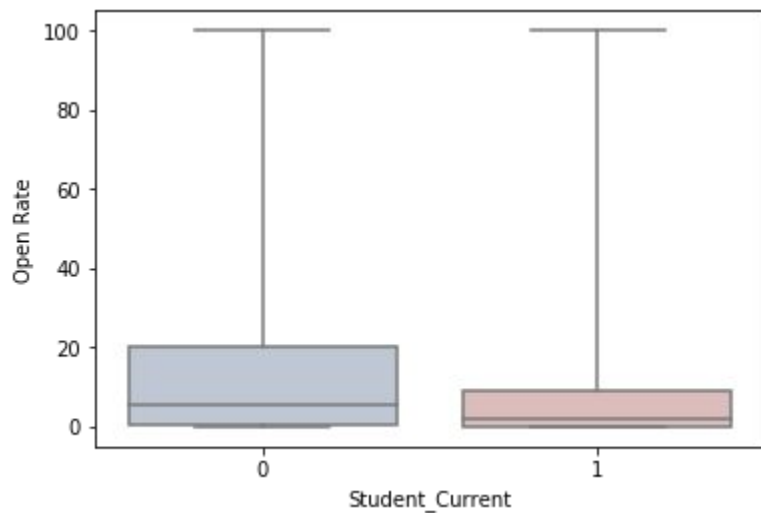
Oops! They fail.



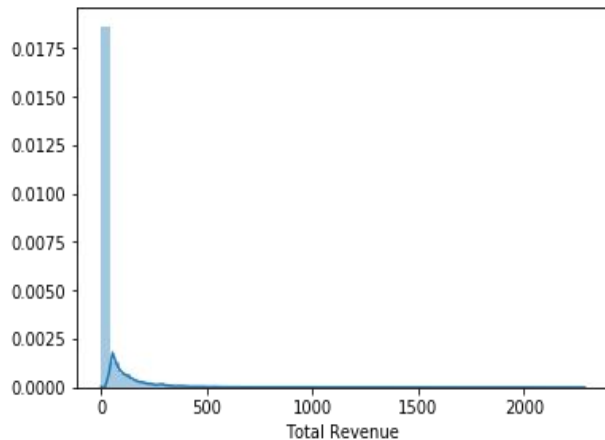
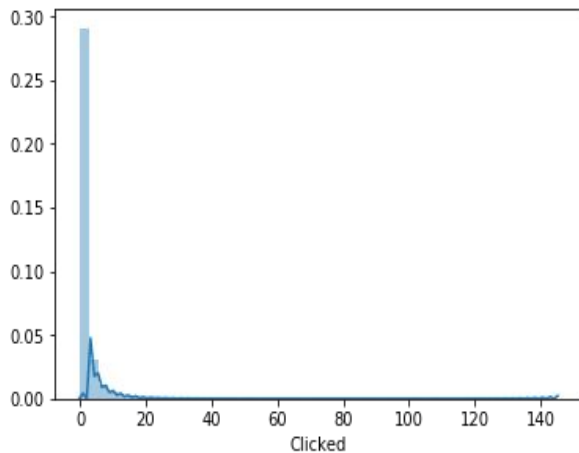
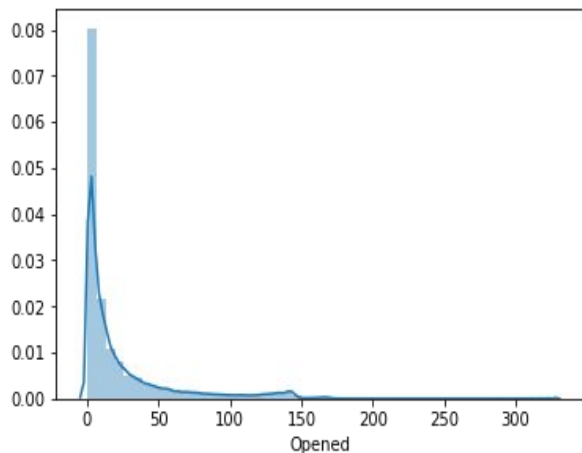
Try to squeeze little information from impossible



Try to squeeze little information from impossible



How to deal with SKEWED data?



Models and Solutions

- **Linear Regression** – R^2 was .005%
- **Discrete Choice Logistic Regression** – Too Few “Conversions”
- **RFM Analysis**
- **Tobit Two-Stage Model**

Linear Regression?

- **Data is Highly Right Skewed**
- **Residual Assumption Not Held**
- **BoxCox Unavailable - dependent variable contains zeros**

→ **Two-Stage Tobit Model**

Choice-based Sampling



Logistic Regression Classifier



Box-Cox Transformation



OLS Regression

Logistic Regression after Choice Based Sampling

Active Customers

Reference

Prediction	Reference	
	0	1
0	98	478
1	9181	50991

Accuracy : 0.841

Unsubscribed Customers

Reference

Prediction	Reference	
	0	1
0	3	176
1	80	5278

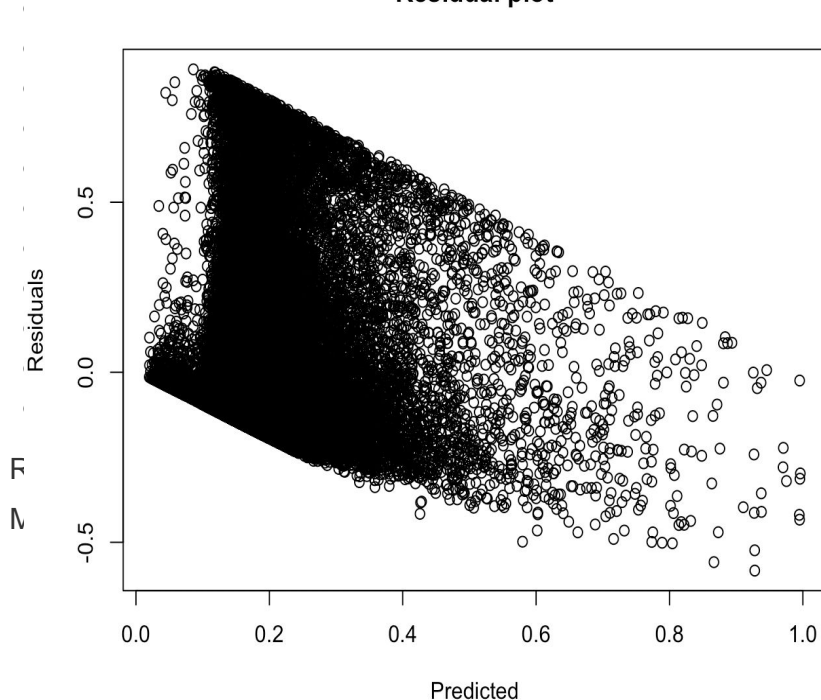
Accuracy : 0.9538

“Given the open rate is not zero, predict the open rate. “

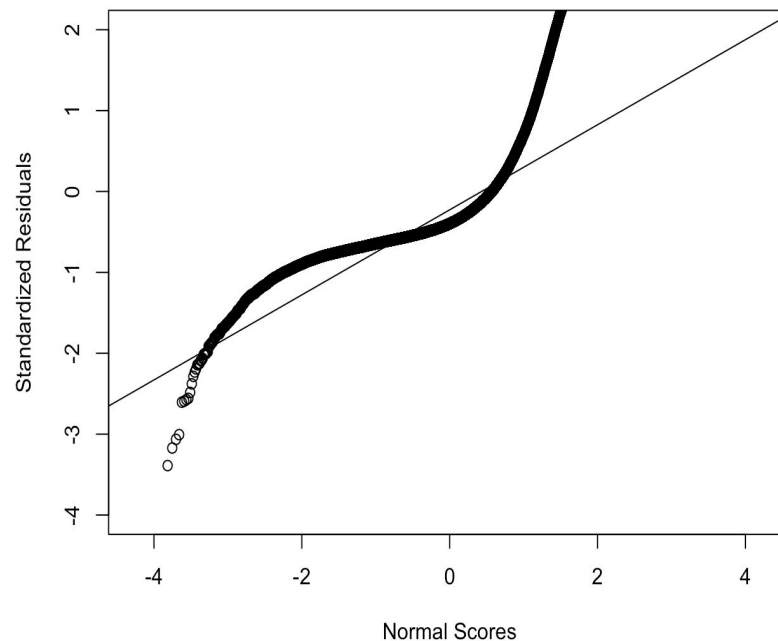
OLS Model Pre Box-Cox

Active Customers

Residual plot

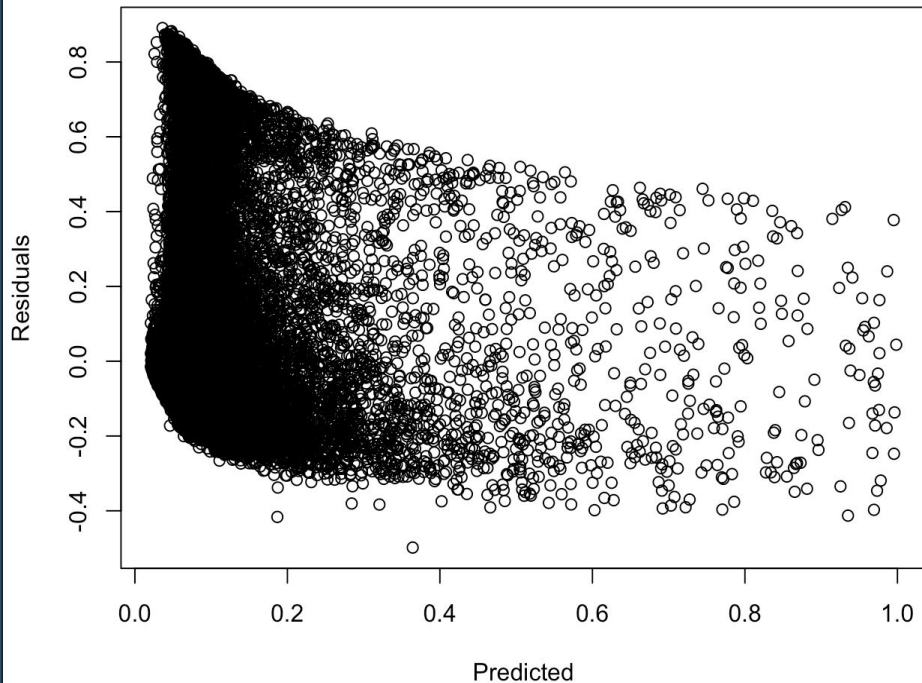


pre BC_Normal Plot

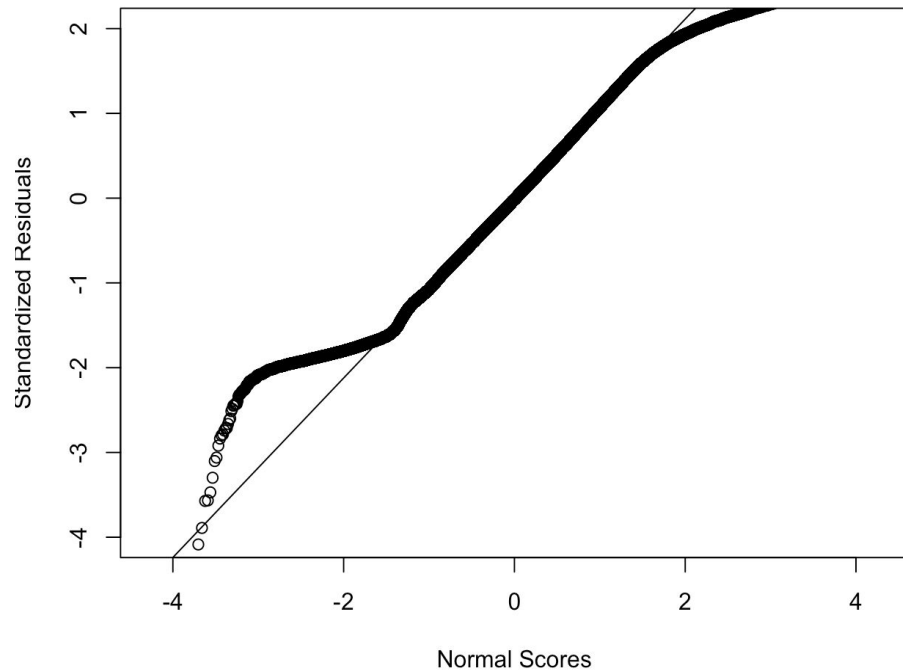


Tobit Model (After implementing box-cox)

Residual plot



BC_Normal Plot

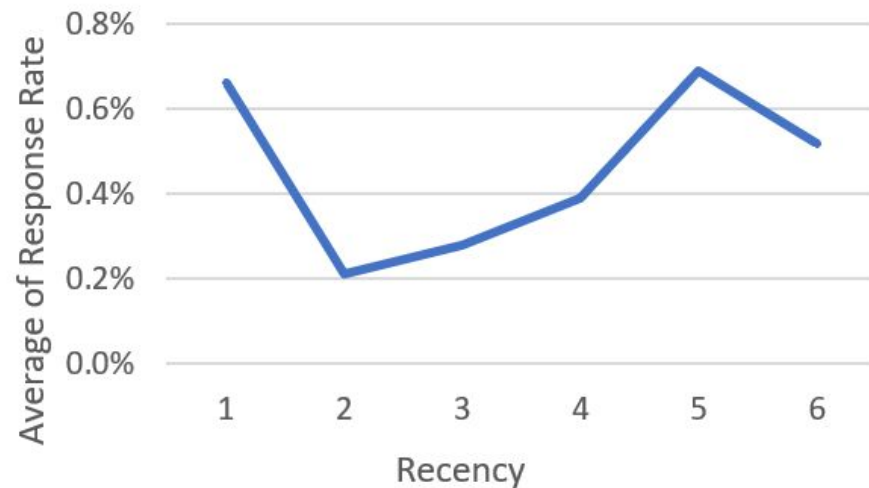


RFM Analysis

- **Recency (1-6)** - Last_order_date:
 - **1** - 2013...
 - **6** - 2018
- **Frequency (1-4)** - Customer_Metrics_Orders:
 - **1** - 1 order
 - **2** - 2 orders
 - **3** - 3 to 5 orders
 - **4** - 6+ orders
- **Monetary (1-5)** - Average_Order_Value:
 - **1** - bottom quintile...
 - **5** - top quintile

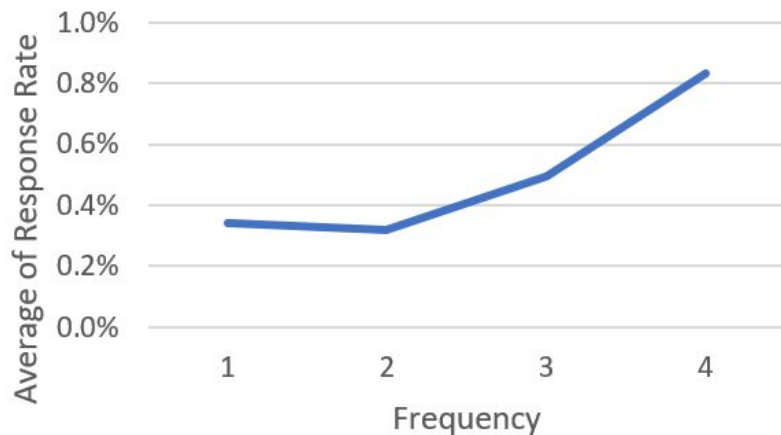
Recency - Relationship with Response

Row Labels	Average of Response
1	0.6623%
2	0.2098%
3	0.2789%
4	0.3895%
5	0.6907%
6	0.5184%
Grand Total	0.4840%



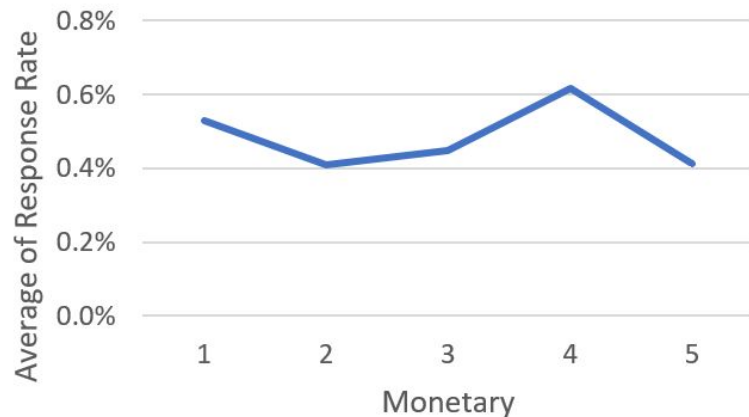
Frequency - Relationship with Response

Row Labels	Average of Response
1	0.3419%
2	0.3177%
3	0.4937%
4	0.8328%
Grand Total	0.4840%



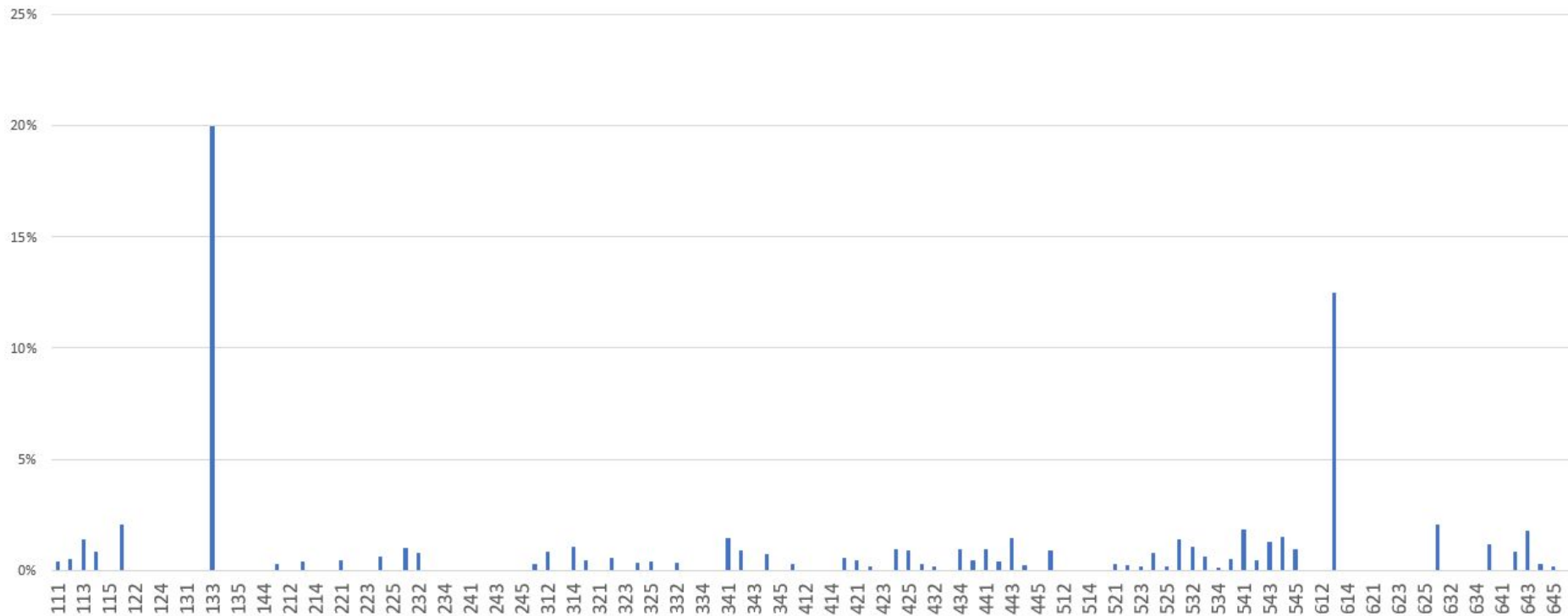
Monetary - Relationship with Response

Row Labels <input type="button" value="▼"/>	Average of Response
1	0.5285%
2	0.4097%
3	0.4495%
4	0.6183%
5	0.4123%
Grand Total	0.4840%



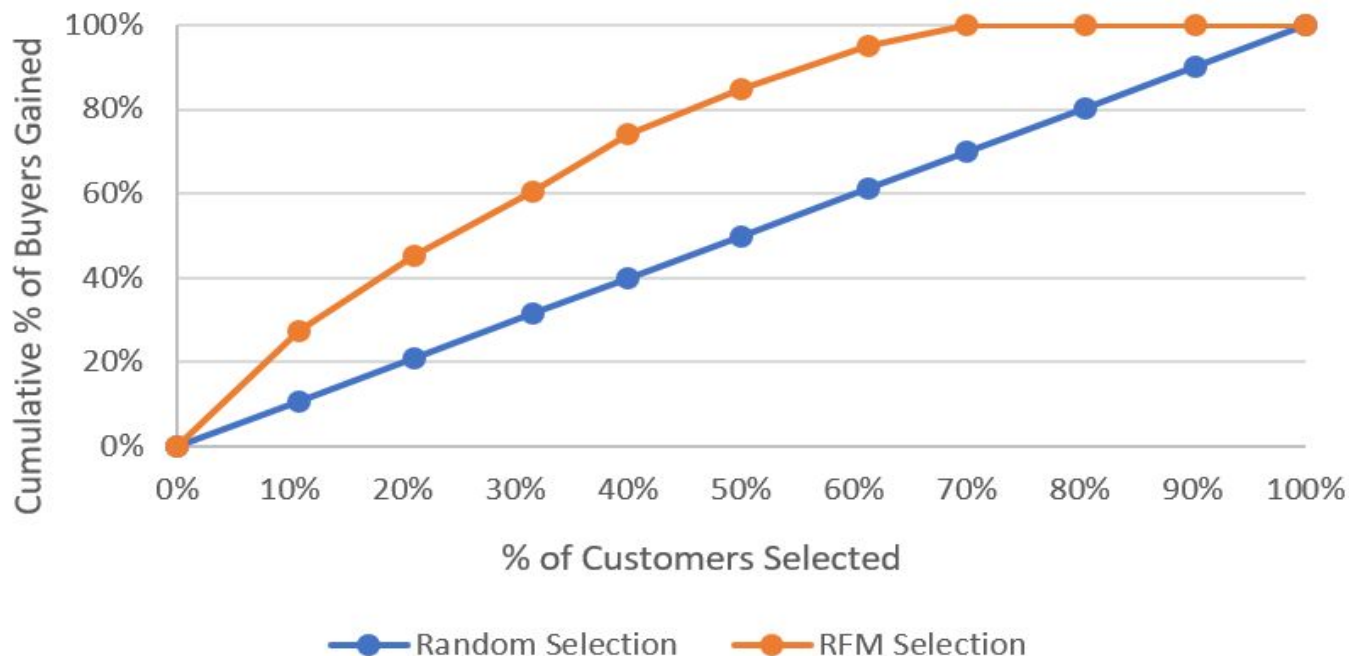
RFM - Relationship with Response

Average of Response



- ❑ **Total # of Customers: 30,374**
- ❑ **Expected # of Buyers: 146**
- ❑ **Expected Buy Rate: 0.484%**

Gains to Targeting



Profitability Analysis

Assumptions

- ❑ **Average Order: \$77**
- ❑ **Average Margin: 25%**
- ❑ **Annual Emails: 25 million**
- ❑ **Software: \$75,000**
- ❑ **Employee Salaries: \$375,000**
- ❑ **Per Email Cost: \$0.018 (0.003 + .015)**
- ❑ **Email Graphic Design: \$600 (4hrs x \$150)**

- ❑ **Breakeven Sales: 60 (0.20% response rate)**

	Everyone	Targeted
Total Customers	30,374	30,374
Emails Sent	30,374	18,959
% of Customers	100%	62%
Expected Sales	146	140
Expected Response Rate	0.48%	0.74%
Total Revenue	11,242.00	10,780.00
Total Inventory Cost	8,431.50	8,085.00
Mailing Cost	546.73	341.26
Total Profit	2,263.77	2,353.74
Profit Margin	20%	22%
Return on Mailing Cost	414%	690%

Lessons Learned

- **New Models** – Tobit, Discrete Choice Logistic Regression
- **Real World Data** – Dirty, incomplete, and doesn't always work
- **Can't Force Results** – Variables can be Insignificant
- **The Professor is On Your Team** – So is Optimism

Questions?

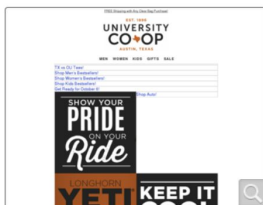
Appendix

Texas vs OU Campaign

 Email Message: 1809TXvsOU [Rename](#)
[Web Preview](#) [Folder](#) [Compare](#)

Schedule Delivery

☒ Regular ☐ Test ☐ A/B Split

[Schedule](#)

[Preview](#)

 Type: HTML Message
 Last Updated: 09/25/2018 10:19 AM

 Previews: [HTML](#) [Web](#) [Text](#)

Subject

Get Ready for TX vs OU!

Has HTML Version

Yes

Has Text Version

Yes

Approved for Transactional

No

Campaign

No Campaign selected

Containing Folder

Messages

Assigned To Feeds

No Feeds

Sent	Delivery Rate	Open Rate	Click Rate	Conversion Rate	Total Revenue
93,724	99.7%	15.9%	8.4%	4.0%	\$3,465.58
93,480		14,834	1,244	50	

[View Full Message Report](#)

Associated Delivery Groups

Show rows: 10 0-0 of 0

Name

No delivery groups were found

Show rows: 10 0-0 of 0

[Add To Delivery Group](#)

Deliveries Of This Message

[Show Advanced Options](#)

 Actions: [Stop Delivery](#)

Show rows: 10 1-1 of 1

<input type="checkbox"/>	Delivery Type	Status	Recipients	Send Date	Sent	Open Rate	Click Rate	Conversion Rate	Revenue	Revenue Per Email	Contact Loss Rate
<input type="checkbox"/>	Normal	Successful	1 List	09/19/2018 10:00 AM	93,724	15.9%	8.4%	4.0%	\$3,465.58	\$0.04	0.1%

 Actions: [Stop Delivery](#)

Show rows: 10 1-1 of 1

Message - Summary Report

Message Report: 1809TXvsOU

USD \$ ▾

All Time ▾

EXPORT ▾

OVERVIEW

DELIVERABILITY

OPENS

CLICKS

CONVERSIONS

DEVICES

DELIVERIES

PROFILER

SUMMARY

93,724

Sends

93,480

Delivered

19,239

Total Opens

2,068

Total Clicks

51

Orders

50

Conversions

0

Contact Updates

REVENUE

\$3,465.58

Total Revenue

\$0.037

Revenue Per Email

\$67.95

Average Order Value

RATES

99.74%

Delivery Rate

15.87%

Open Rate

8.39%

Click Rate

4.02%

Conversion Rate

0.05%

Net Response Rate

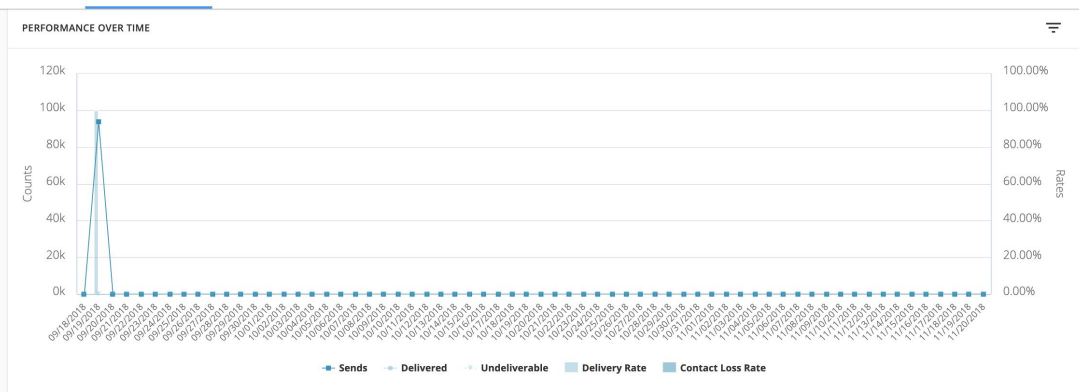
0.00%

Contact Update Rate

Message Deliverability: Limited to Domain Level Data

Message Report: 1809TXvsOU

USD \$ ▾ All Time ▾ EXPORT ▾

 OVERVIEW **DELIVERABILITY** OPENS CLICKS CONVERSIONS DEVICES DELIVERIES PROFILER


DELIVERABILITY BY DOMAIN (ALL TIME)

Domain	Sends	Delivered	Delivery Rate	Contact Loss Rate	Hard Bounce	Soft Bounce	Unsubscribes	Complaints
163.com	36	36	100.00%	0.00%	0	0	0	0
adelphia.net	1	1	100.00%	0.00%	0	0	0	0
aim.com	43	43	100.00%	0.00%	0	0	0	0
ameritech.net	12	12	100.00%	0.00%	0	0	0	0

Message Conversions:

Access to Customer Level Data

 Message Report: **1809TXvsOU**

USD \$ ▾

All Time ▾

 EXPORT 

OVERVIEW

DELIVERABILITY

OPENS

CLICKS

CONVERSIONS

DEVICES

DELIVERIES

PROFILER

ORDERS (ALL TIME)

☐ Show All (Disable Currency Filter)


Order Id	Customer Order Id	Status	Order Date	Creation Date ▾	Contact Email	Tax Amount	Discount Amount	Subtotal	Shipping Amount	Grand Total
ab7baffd-dc84-4bd8-af19-21fe366f8a07	SO42938	Processed	11/19/2018 1:41 PM	11/19/2018 1:41 PM	karo62611@gmail.com	\$3.13	\$0.00	\$32.00	\$5.99	\$41.12
1be3512b-dd43-4e63-978c-b4c839efe607	SO39734	Processed	10/25/2018 9:26 PM	10/25/2018 9:26 PM	jlemons66@utexas.edu	\$2.15	\$0.00	\$26.00	\$0.00	\$28.15
0b58ed73-ac2f-40b5-9ab9-e15c4633dc5f	SO36123	Processed	10/02/2018 11:52 AM	10/02/2018 11:52 AM	yourfutureboss_moss...	\$5.90	\$3.76	\$71.49	\$0.00	\$77.39
fd5b9ceb-c992-4098-98a9-0d566f6b23a1	SO35869	Processed	10/01/2018 11:49 AM	10/01/2018 11:49 AM	cwelch0430@yahoo.c...	\$0.00	\$0.00	\$43.00	\$14.99	\$57.99
3f4a7c50-4ee9-40a5-baec-c1fdd409ab9b	SO35507	Processed	09/29/2018 5:17 PM	09/29/2018 5:17 PM	van42705@gmail.com	\$15.59	\$0.00	\$164.00	\$24.99	\$204.58