



# Applied Analytics Capstone

## Nuveen Sales Models

# Agenda



Background



Objective



Methodology



Cleaning the Data



Decision Tree Analysis



Model 1,2,3: Findings



Recommendations

# Background

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Nuveen is an American asset manager and a subsidiary of TIAA. Nuveen has over \$1.2 trillion in assets making them one of the largest investment managers

Nuveen sells their products through financial advisors, planners and brokers

Nuveen sells products including Mutual funds, Closed-end funds, Exchange-traded funds, Separately managed accounts

The dataset contained transaction details over 3 years (2018-2020) from 10,010 unique advisors

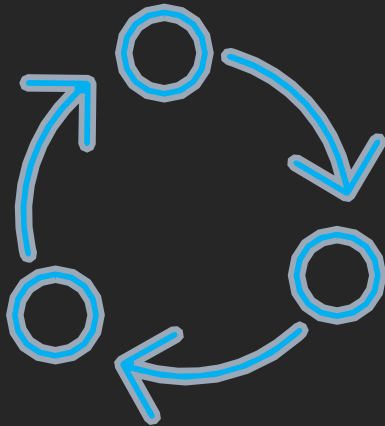
# Objective

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The objective of this analysis is to predict sales over the next 12 months so that Nuveen can prioritize their sales coverage and choose between field, phone or web to contact advisors



# Methodology



Analyze and Understand the Data



Clean the Data / Managed Outliers



Created Independent Variables



Divide the Data into different modelling groups



Separate Groups into Testing and Training Datasets



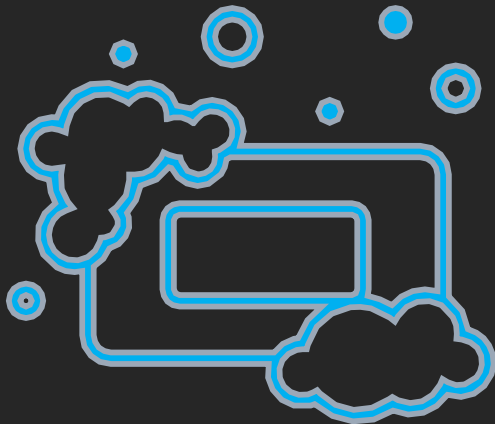
Run a Regression Analysis and Validate the Model Using the Testing Data



Create a Lift Chart for each model and Provide Recommendations



# Cleaning the Data



In order to manage outliers, we capped every variable at the 99% level

Some of the outliers include:

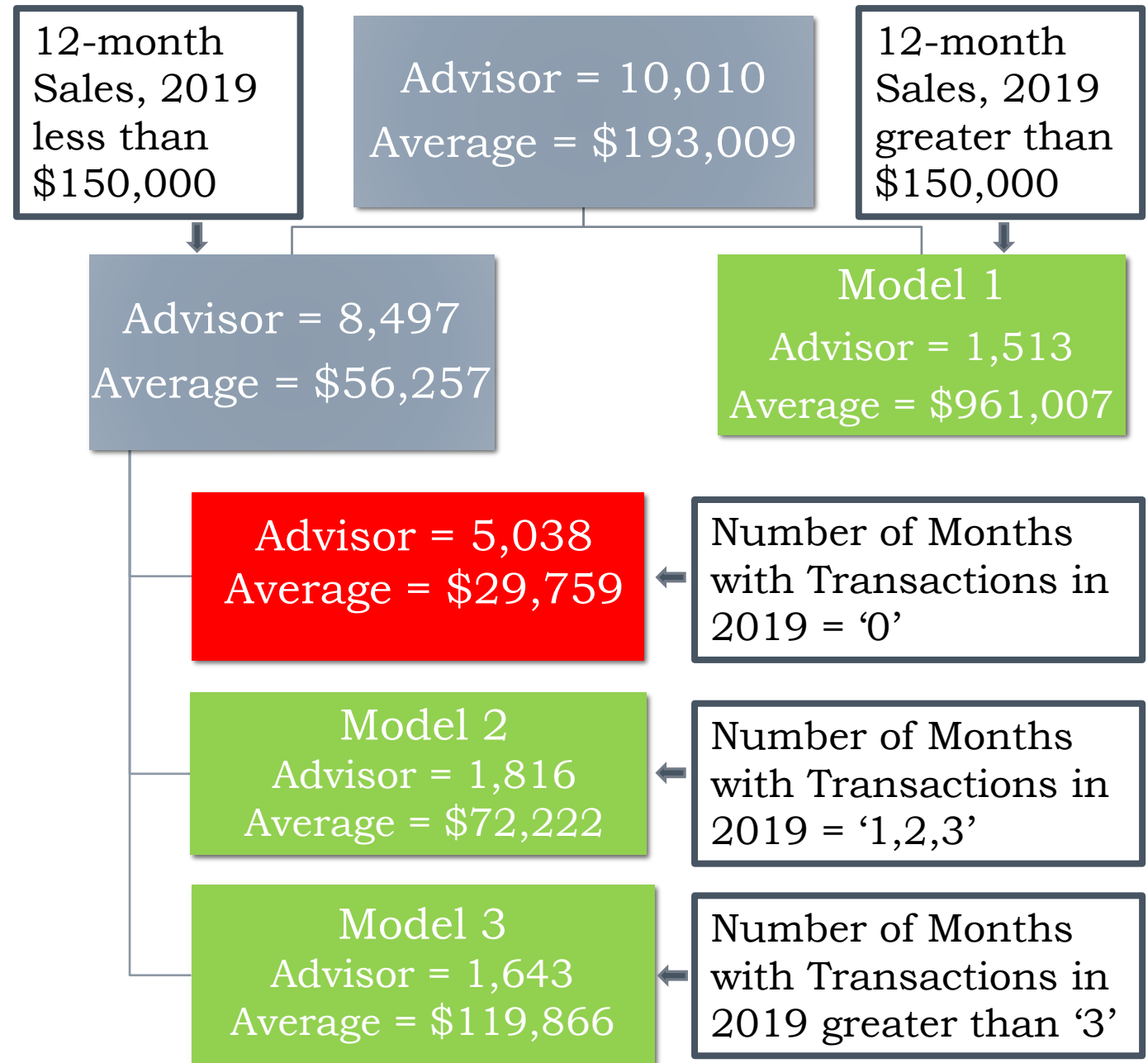
- Over 2000 sales over \$1 in 2018
- Over 10,000 redemptions over \$1 in 2018
- Over 900 sales over \$10k in 2018
- Negative Sales in 2018
- Over 2000 sales over \$1 in 2019
- Negative Sales in 2019

# Decision Tree Analysis

Dataset included 10,010 advisors

Data Split occurred through '12-month sales, 2019' and 'Number of Months with Transactions in 2019'

Model in which 'Number of Months with Transactions in 2019' is '0' was not used because of lack of significant data



# Model 1

12 Month Sales up to Nov 2019 greater than \$150,000  
1513 Advisors

*“BEING THE BEST IS GREAT. I’M **NUMBER ONE**. BUT BEING  
UNIQUE IS GREATER, I’M THE ONLY ONE” - ANONYMOUS*



# Model 1 - Independent Variables

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## Positive Influencers

- 12-month Sales Transactions > \$10k, 2018
- 12-month Funds Redeemed >\$1, 2018
- 12-month Sales, 2019
- 12-month Sales Transactions > \$10k, 2019
- Net Sales, 2019
- Assets Under Management
  - AC Fixed Income Taxable, 2018
  - AC Fixed Income Municipal, 2019
  - AC Money, 2019
  - Mutual Funds, 2019

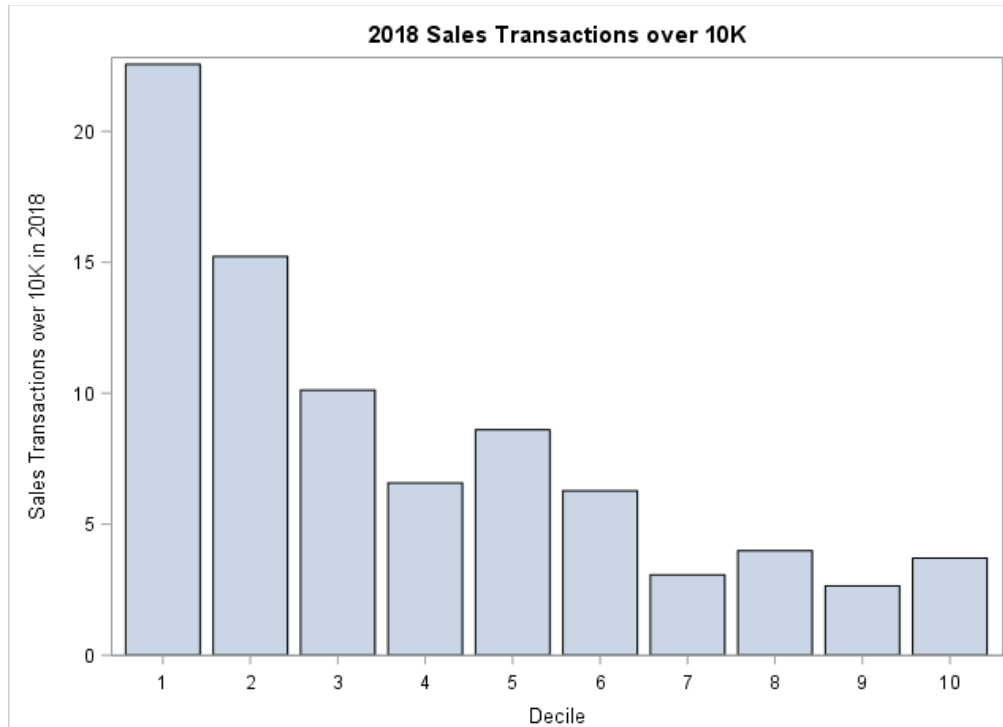
# Model 1 - Independent Variables

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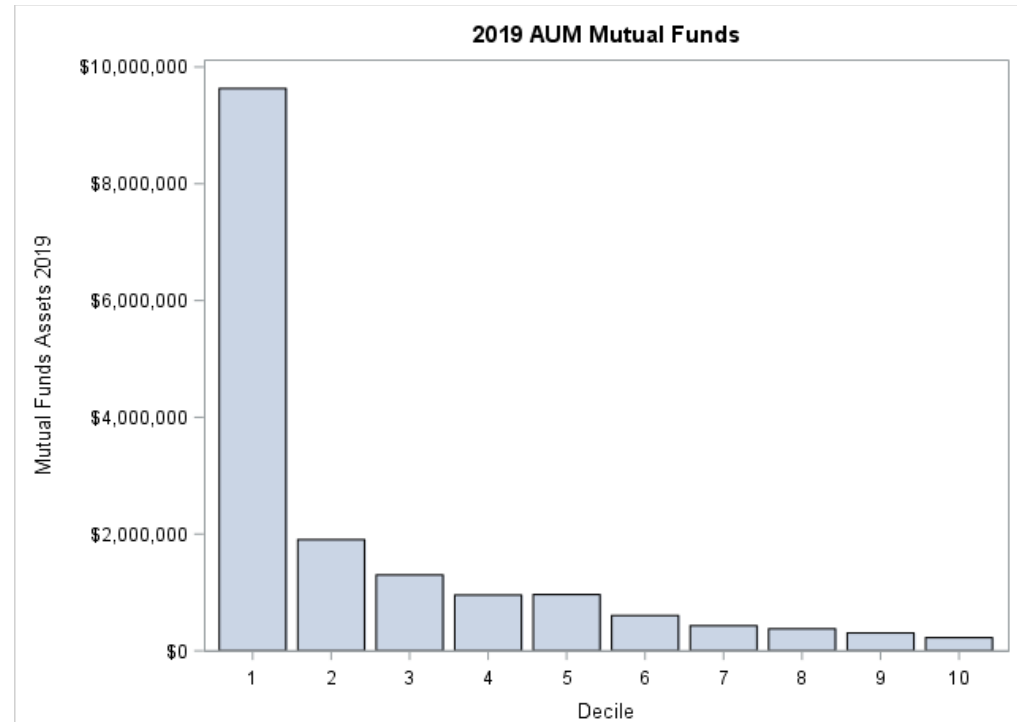
## **Negative Influencers**

- Net Sales, 2018
- Assets Under Management
  - Mutual Funds, 2018
  - AC Fixed Income Taxable, 2018

# Model 1 – Variables



Advisors in deciles 1,2 have a higher number of Sales Transactions greater than \$10K in 2018



Advisors in decile 1 manage much more Mutual Funds Assets in 2019

# Model 1 – Lift Chart

Decile	Number of Advisors	Actual Sales Per Advisor	Lift Over Average	Cumulative No. of Advisors	Cumulative Sales Per Advisor	Cumulative Lift
1	75	\$4,154,752.61	352%	75	\$ 4,154,753	352%
2	76	\$1,394,446.00	52%	151	\$ 2,765,459	201%
3	76	\$ 917,888.00	0%	227	\$ 2,146,889	133%
4	75	\$ 525,868.57	-43%	302	\$ 1,744,318	90%
5	76	\$ 518,163.85	-44%	378	\$ 1,497,789	63%
6	76	\$ 383,711.01	-58%	454	\$ 1,311,292	43%
7	75	\$ 291,776.62	-68%	529	\$ 1,166,748	27%
8	76	\$ 339,701.21	-63%	605	\$ 1,062,855	16%
9	76	\$ 190,611.43	-79%	681	\$ 965,512	5%
10	75	\$ 480,480.07	-48%	756	\$ 917,393	0%
Total	756	\$ 919,739.94				

Advisors in deciles 1,2 have a positive lift and have a cumulative lift of **201%**

# Model 2

12 Month Sales up to Nov 2019 less than \$150,000  
Number of Transactions in 2019 is 1,2 or 3

1816 Advisors

*“ISN’T IT FUNNY THAT THE **NUMBER 2** PENCIL IS THE MOST POPULAR?” – ANONYMOUS*

# Model 2 - Independent Variables

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## Positive Influencers

- |  |   |
|--|---|
| <ul style="list-style-type: none"><li>• 12-month Funds Sold &gt;\$10k, 2018</li><li>• 12-month Funds Redeemed &gt;\$10k, 2018</li><li>• 12-month Redemptions&gt;\$10k, 2019</li><li>• 12-month Funds Redeemed &gt;\$1, 2019</li><li>• 12-month AC Redeemed&gt;\$10k, 2019</li><li>• 12-month Sales, 2019</li><li>• Net Sales, 2018</li></ul> | <ul style="list-style-type: none"><li>• Assets Under Management<ul style="list-style-type: none"><li>• AC Fixed Income Municipal, 2018</li><li>• AC Fixed Income Taxable, 2018</li><li>• Unit Investment Trusts, 2018</li><li>• AC Equity, 2019</li><li>• AC Target, 2019</li><li>• Separately Managed Accounts, 2019</li></ul></li></ul> |
|--|---|



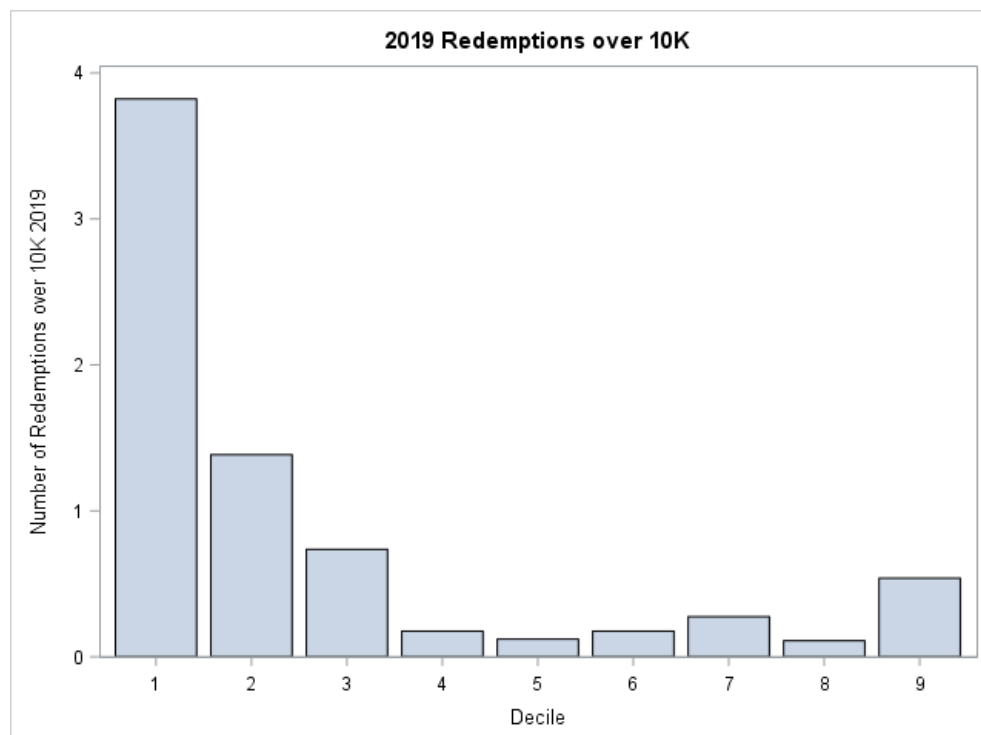
# Model 2 - Independent Variables

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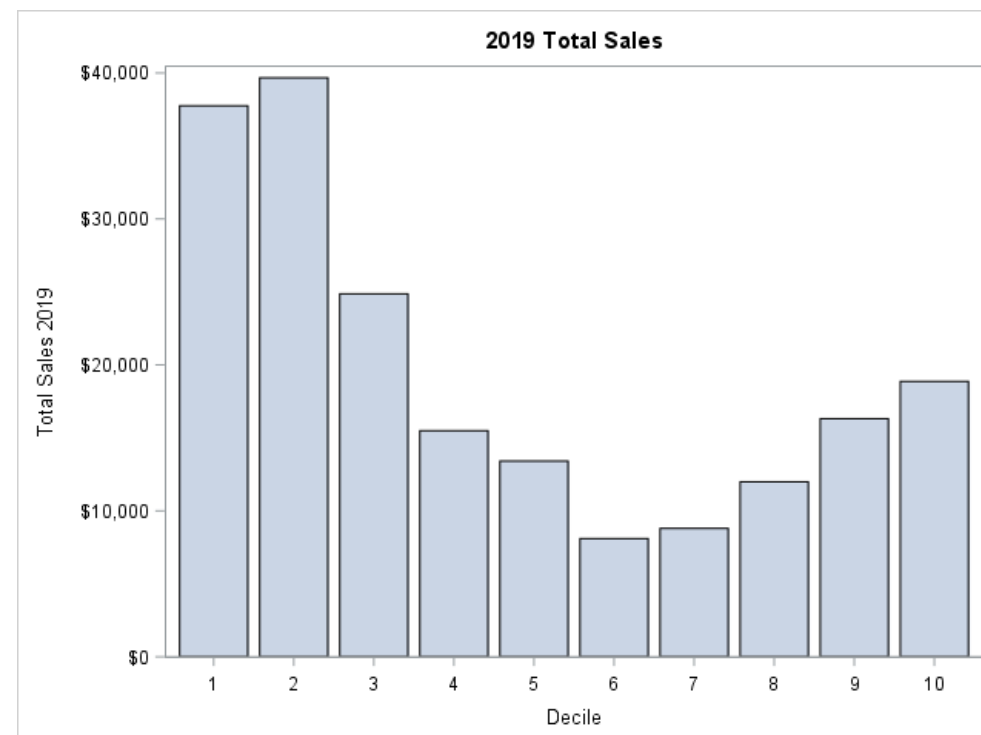
## **Negative Influencers**

- 12-month Sales Transactions > \$10k, 2018
- 12-month Asset Class Sales > \$10k, 2018
- 12-month AC Redeemed > \$10k, 2018
- 12-month Redemptions > \$1, 2019
- 12-month Funds Redeemed > \$10k, 2019
- Net Sales, 2019
- Assets Under Management
  - AC Equity, 2018
  - AC Target, 2018
  - Separately Managed Accounts, 2018
  - AC Fixed Income Municipal, 2019

# Model 2 – Variables



Advisors in deciles 1,2 have a higher number of Redemptions greater than \$10K in 2019



Average total sales in 2019 per Advisor is the highest in the first two deciles

# Model 2 – Lift Chart

Decile	Number of Advisors	Actual Sales Per Advisor	Lift Over Average	Cumulative No. of Advisors	Cumulative Sales Per Advisor	Cumulative Lift
1	90	\$ 171,625.06	103%	90	\$ 171,625	103%
2	91	\$ 101,970.36	21%	181	\$ 136,605	62%
3	91	\$ 66,764.22	-21%	272	\$ 113,239	34%
4	91	\$ 71,063.93	-16%	363	\$ 102,666	21%
5	91	\$ 34,619.41	-59%	454	\$ 89,027	5%
6	91	\$ 35,745.30	-58%	545	\$ 80,130	-5%
7	91	\$ 55,405.08	-34%	636	\$ 76,593	-9%
8	91	\$ 9,698.29	-89%	727	\$ 68,219	-19%
9	91	\$ 117,056.00	38%	818	\$ 73,652	-13%
10	90	\$ 181,892.51	115%	908	\$ 84,381	0%
Total	908	\$ 84,584				

Advisors in deciles 1,2 have a positive lift and have a cumulative lift of **62%**

# Model 3

12 Month Sales up to Nov 2019 less than \$150,000  
Number of Transactions in 2019 greater than 3

1643 Advisors

*“NUMBER 47 SAID TO **NUMBER 3**, YOU’RE THE CUTEST  
JAILBIRD I EVER DID SEE” – ELVIS PRESLEY*

# Model 3 - Independent Variables

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## Positive Influencers

- 12-month Sales Transactions > \$10k, 2018
- 12-month Funds Sold >\$10k, 2018
- 12-month Funds Redeemed > \$10k, 2018
- 12-month Funds Redeemed >\$1, 2019
- 12-month Asset Class Sales > \$1, 2019
- Assets Under Management
  - AC Target Date Funds, 2019
  - Mutual Funds, 2019

# Model 3 - Independent Variables

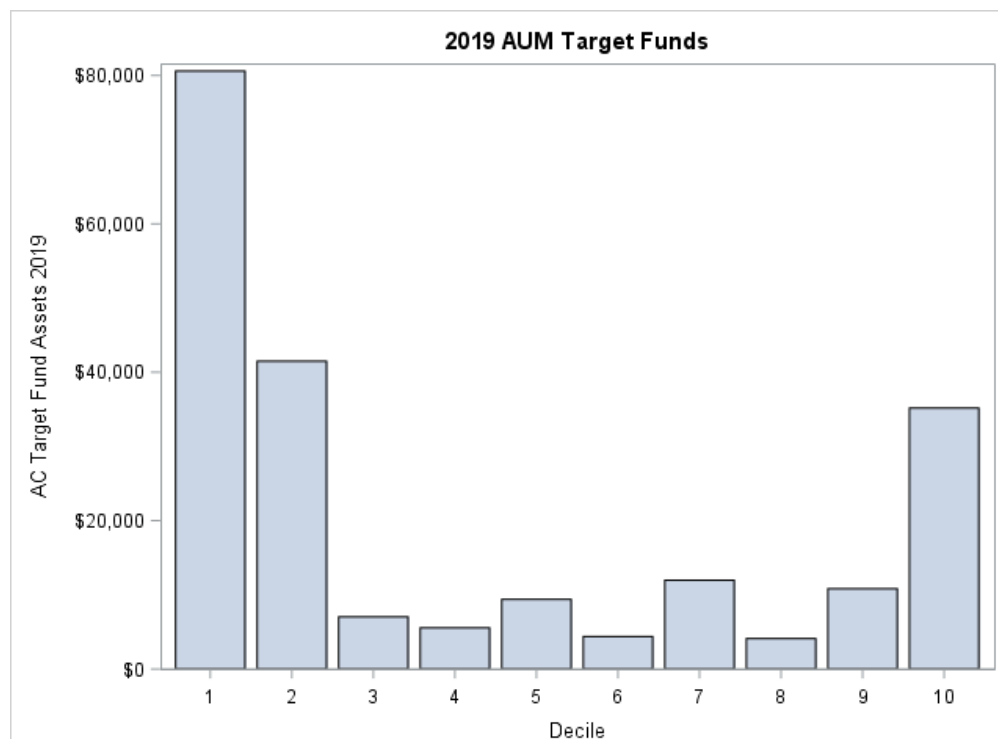
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## Negative Influencers

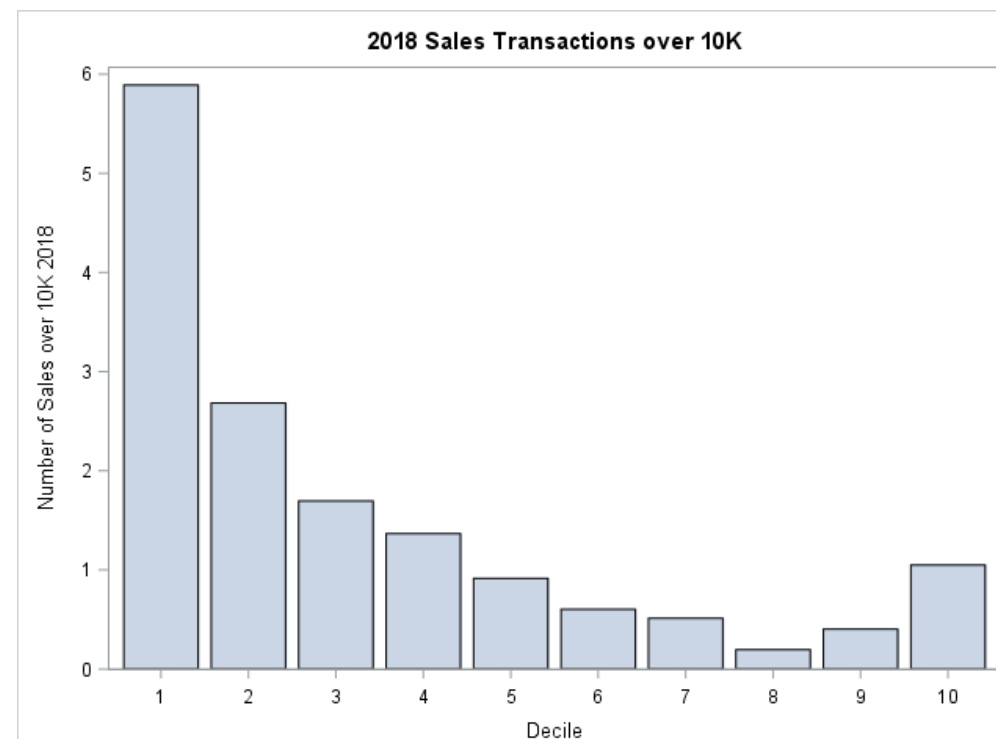
- 12-month Funds Redeemed > \$1, 2018
- 12-month Asset Class Sales > \$10k, 2018
- 12-month AC Redeemed > \$10k, 2018
- Assets Under Management
  - AC Target Date Funds, 2018
  - Mutual Funds, 2018



# Model 3 – Variables



Advisors in deciles 1,2 manage more Target Funds Assets in 2019



The number of Sales Transactions over 10K decreases throughout the deciles

# Model 3 – Lift Chart

Decile	Number of Advisors	Actual Sales Per Advisor	Lift Over Average	Cumulative No. of Advisors	Cumulative Sales Per Advisor	Cumulative Lift
1	82	\$ 320,335.32	150%	82	\$ 320,335	150%
2	82	\$ 165,505.21	29%	164	\$ 242,920	89%
3	82	\$ 180,930.63	41%	246	\$ 222,257	73%
4	82	\$ 86,837.34	-32%	328	\$ 188,402	47%
5	82	\$ 168,992.39	32%	410	\$ 184,520	44%
6	83	\$ 82,154.58	-36%	493	\$ 167,286	30%
7	82	\$ 104,639.47	-18%	575	\$ 158,352	23%
8	82	\$ 21,821.92	-83%	657	\$ 141,312	10%
9	82	\$ 79,914.53	-38%	739	\$ 134,499	5%
10	82	\$ 71,297.39	-44%	821	\$ 128,187	0%
Total	821	\$ 128,243				

Advisors in deciles 1,2,3 have a positive lift and have a cumulative lift of **73%**

# Recommendations

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- Advisors who generate over **\$500,000** in sales should be high priority to the Sales team, these advisors are in:
  - Deciles 1-5 in Model 1
- Advisors who generate between **\$300,000 - \$500,000** in sales should be a lower priority to the Sales team, these advisors are in:
  - Deciles 6-8 in Model 1
  - Decile 1 in Model 3
- Advisors who generate between **\$100,000 - \$300,000** in sales should be a priority to the Tele-sales team, these advisors are in:
  - Deciles 9-10 in Model 1
  - Deciles 1-2 in Model 2
  - Deciles 2-3 in Model 3
- The rest of the advisors should be contacted through the website or emails.

Thank You!  
Any Questions?

*“TO ASK THE RIGHT QUESTION IS HARDER THAN TO  
ANSWER IT.” – GEORG CANTOR*

# Appendix

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Outliers – 12-month Sales Transactions > \$1, 2018

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0	10009	1586	8702
0	10007	1917	5095
0	10005	2263	8521
0	10004	3209	1587
0	10002	4067	6729

Quantiles (Definition 5)	
Level	Quantile
100% Max	4067
99%	305
95%	82
90%	36
75% Q3	8
50% Median	0
25% Q1	0
10%	0
5%	0
1%	0
0% Min	0

# Appendix

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Outliers – 12-month Redemptions > \$1, 2018

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0	10007	1498	289
0	10006	3250	4545
0	10005	3622	1587
0	10003	11507	7830
0	10001	11581	1980

Quantiles (Definition 5)	
Level	Quantile
100% Max	11581
99%	282
95%	71
90%	31
75% Q3	7
50% Median	1
25% Q1	0
10%	0
5%	0
1%	0
0% Min	0



# Appendix

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Outliers – 12-month Sales Transactions > \$10K, 2018

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0	10010	163	6230
0	10009	170	5641
0	10008	228	5393
0	10007	270	6446
0	10005	986	4570

Quantiles (Definition 5)	
Level	Quantile
100% Max	986
99%	38
95%	10
90%	4
75% Q3	1
50% Median	0
25% Q1	0
10%	0
5%	0
1%	0
0% Min	0

# Appendix

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Outliers – 12-month Redemptions > \$10K, 2018

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
0	10010	159	6337
0	10009	205	7255
0	10008	277	9943
0	10007	283	4545
0	10006	883	4570

Quantiles (Definition 5)	
Level	Quantile
100% Max	883
99%	25
95%	7
90%	3
75% Q3	1
50% Median	0
25% Q1	0
10%	0
5%	0
1%	0
0% Min	0

# Appendix

## Model 1

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	-243980	94739	1.421196E13	6.63	0.0102
no_of_sales_12M_10K_NOV2018	12915	7740.14874	5.965815E12	2.78	0.0956
no_of_funds_red_12M_1_NOV2018	61684	18669	2.339449E13	10.92	0.0010
aum_AC_FI_TAXABLE_NOV2018	0.72045	0.18493	3.252327E13	15.18	0.0001
aum_P_MF_NOV2018	-0.44388	0.07623	7.266088E13	33.91	<.0001
no_of_sales_12M_10K_NOV2019	14611	7265.32586	8.666321E12	4.04	0.0447
sales_12M_NOV2019	0.18837	0.11579	5.671181E12	2.65	0.1042
aum_AC_FIXED_INCOME_MUNI_NOV2019	0.25896	0.05715	4.399407E13	20.53	<.0001
aum_AC_FI_TAXABLE_NOV2019	-0.62252	0.18192	2.509389E13	11.71	0.0007
aum_AC_MONEY_NOV2019	0.53551	0.16267	2.322382E13	10.84	0.0010
aum_P_MF_NOV2019	0.25158	0.02391	2.372009E14	110.69	<.0001
Netsales2018	-0.06578	0.04054	5.642194E12	2.63	0.1051
Netsales2019	0.09370	0.04210	1.061725E13	4.95	0.0263
sales24mo	0.07814	0.02944	1.509159E13	7.04	0.0081

# Appendix

## Model 2

Variable	Parameter Estimate	Standard Error	Type II SS	F Value	Pr > F
Intercept	19108	8993.23134	1.35054E11	4.51	0.0339
no_of_sales_12M_10K_NOV2018	-15497	3885.02182	4.760321E11	15.91	<.0001
no_of_fund_sales_12M_10K_NOV2018	108360	23924	6.137379E11	20.51	<.0001
no_of_funds_Red_12M_10K_NOV2018	143057	20267	1.490657E12	49.83	<.0001
no_of_ac_sales_12M_10K_NOV2018	-83542	30543	2.238242E11	7.48	0.0064
no_of_ac_Red_12M_10K_NOV2018	-141182	25466	9.194998E11	30.73	<.0001
aum_AC_EQUITY_NOV2018	-0.43311	0.14073	2.833532E11	9.47	0.0022
aum_AC_FIXED_INCOME_MUNI_NOV2018	0.57870	0.09927	1.016771E12	33.99	<.0001
aum_AC_FI_TAXABLE_NOV2018	0.16118	0.04612	3.653673E11	12.21	0.0005
aum_AC_TARGET_NOV2018	-1.79291	0.36427	7.247552E11	24.23	<.0001
aum_P_SMA_NOV2018	-1.00765	0.10159	2.943523E12	98.39	<.0001
aum_P_UTI_NOV2018	0.38366	0.08845	5.629051E11	18.82	<.0001
no_of_Redemption_12M_1_NOV2019	-1350.96622	496.88308	2.211584E11	7.39	0.0067
no_of_Redemption_12M_10K_NOV2019	16044	4313.78174	4.138565E11	13.83	0.0002
no_of_funds_red_12M_1_NOV2019	13732	5515.10922	1.854812E11	6.20	0.0130
no_of_funds_Red_12M_10K_NOV2019	-95895	21648	5.870667E11	19.62	<.0001
no_of_ac_Red_12M_10K_NOV2019	57829	26450	1.430132E11	4.78	0.0290
sales_12M_NOV2019	0.71137	0.19610	3.936793E11	13.16	0.0003
aum_AC_EQUITY_NOV2019	0.49696	0.14284	3.621212E11	12.10	0.0005
aum_AC_FIXED_INCOME_MUNI_NOV2019	-0.50768	0.09779	8.063815E11	26.95	<.0001
aum_AC_TARGET_NOV2019	1.28693	0.19806	1.26313E12	42.22	<.0001
aum_P_SMA_NOV2019	0.98850	0.10125	2.851423E12	95.31	<.0001
Netsales2018	0.12886	0.02928	5.795065E11	19.37	<.0001
Netsales2019	-0.20443	0.04250	6.921916E11	23.14	<.0001

# Appendix

## Model 3

Variable	Parameter Estimate	Standard Error	Type III SS	F Value	Pr > F
Intercept	10651	25661	15836049910	0.17	0.6782
no_of_sales_12M_10K_NOV2018	9542.14970	4468.10547	4.192455E11	4.56	0.0330
no_of_funds_red_12M_1_NOV2018	-14517	7957.51911	3.059187E11	3.33	0.0685
no_of_fund_sales_12M_10K_NOV2018	43490	23375	3.182056E11	3.46	0.0632
no_of_funds_Red_12M_10K_NOV2018	110877	26645	1.591756E12	17.32	<.0001
no_of_ac_sales_12M_10K_NOV2018	-85591	33971	5.835315E11	6.35	0.0119
no_of_ac_Red_12M_10K_NOV2018	-85428	36943	4.915355E11	5.35	0.0210
aum_AC_TARGET_NOV2018	-2.43477	0.16742	1.944057E13	211.49	<.0001
aum_P_MF_NOV2018	-0.21066	0.06723	9.024787E11	9.82	0.0018
no_of_funds_red_12M_1_NOV2019	15981	7165.58882	4.572E11	4.97	0.0260
no_of_ac_sold_12M_1_NOV2019	32113	15665	3.862913E11	4.20	0.0407
aum_AC_TARGET_NOV2019	2.20258	0.17605	1.43886E13	156.53	<.0001
aum_P_MF_NOV2019	0.25963	0.05926	1.764343E12	19.19	<.0001