

nuveen

A TIAA Company

Applied Analytics Capstone

Agenda

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Background

Nuveen, formerly Nuveen Investments, a subsidiary of TIAA, is an American global investment manager

Nuveen is one of the largest investment managers in the world with \$1.1 trillion in assets under management

Nuveen offers a range of investment capabilities across income, equities, alternatives and multi-asset solutions

Objectives

Goal: Develop a series of models that predict sales 12 months into the future to help acquire new customers while developing and retaining existing customers

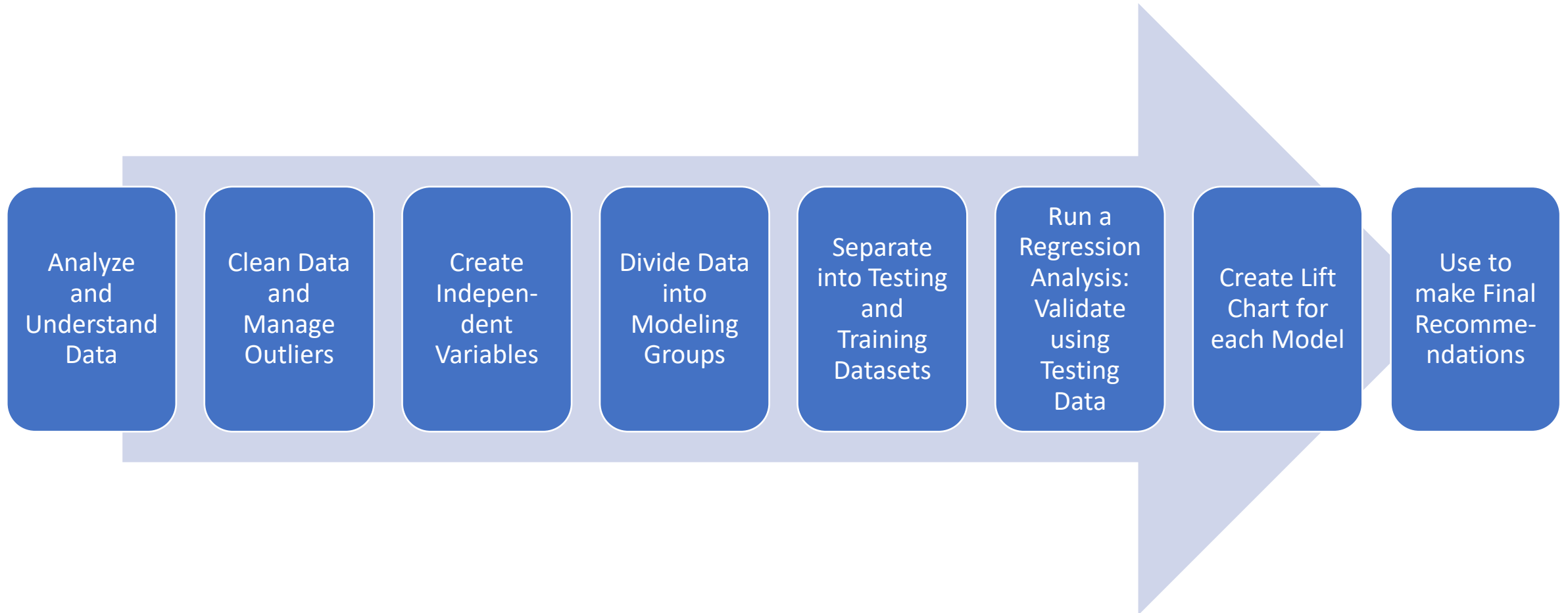
Data Provided

Dataset contains 36 months of data; may use data from December 2012 to November 2019 to predict the next 12 months

Determine how many models need to be used and what the groups are

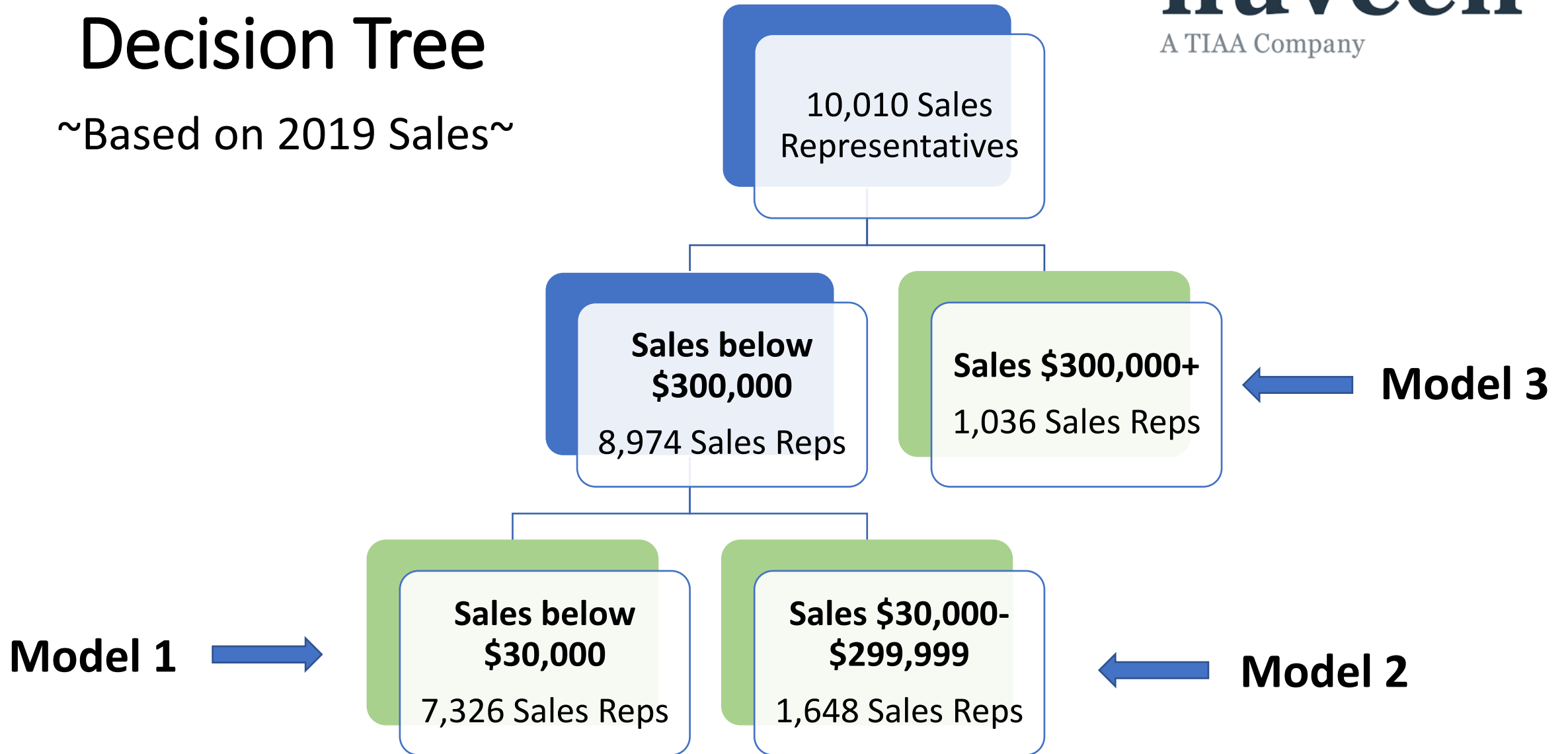
Determine best technique

Methodology



Decision Tree

~Based on 2019 Sales~



Model 1



12 Month Sales
up to November
2019 less than
\$30,000

The diagram consists of two chevron-shaped boxes pointing to the right. The first box is dark blue and contains the text '12 Month Sales up to November 2019 less than \$30,000'. The second box is light blue and contains the text '73.2% of Advisors'. A white arrow points from the right side of the first box to the left side of the second box.

73.2% of
Advisors

Model 1- Positive Influencers

Independent Variable

- Assets under management in target funds of Nov. 2019
- 12-month sales up to November 2018
- Number of asset classes sold up to November 2019 for at least \$1

Model 1- Negative Influencers

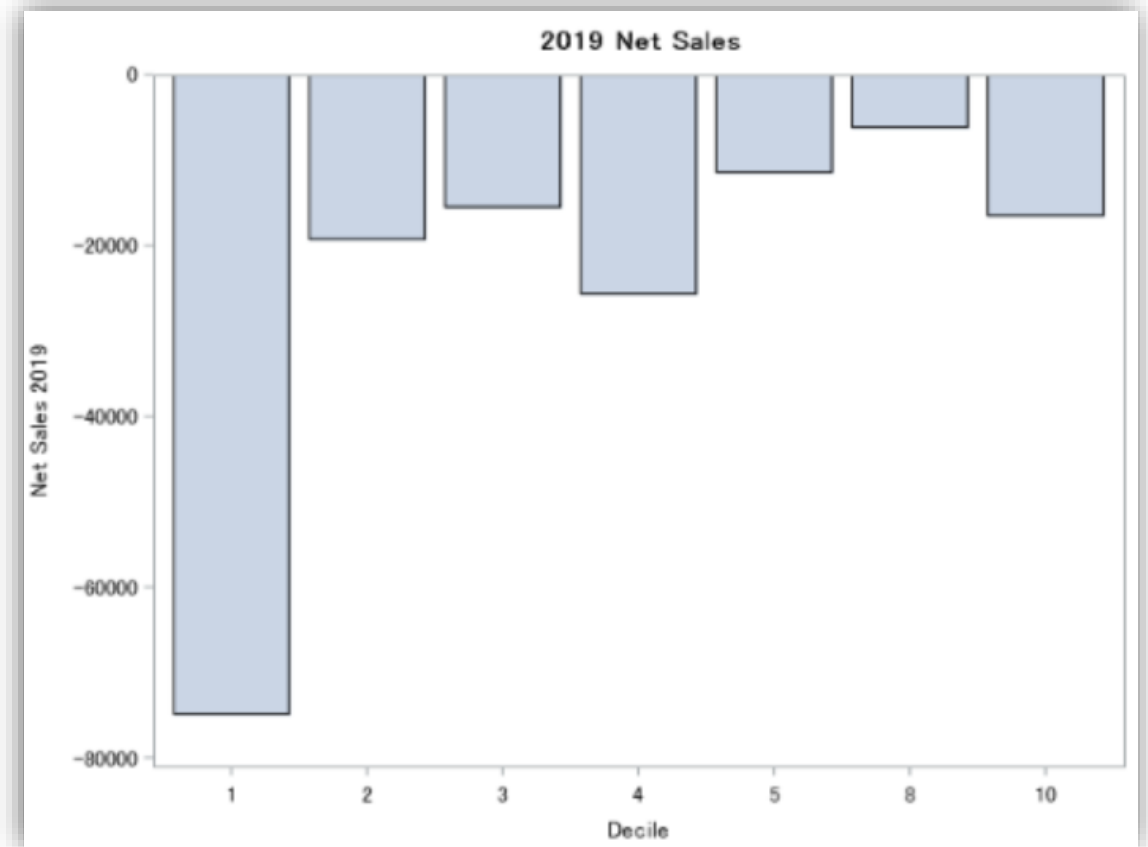
Independent Variables

- Assets under management in target funds of Nov. 2018

Model 1 - Variables



Advisors in decile 1 manage more Target Fund Assets and advisors in decile 10 are losing assets in 2019



Advisors in decile 1 had much more negative net sales 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	366	\$119,277.44	179%	366	\$119,277	179%
2	366	\$45,489.03	6%	732	\$82,383	93%
3	435	\$35,941.56	-16%	1,167	\$65,072	52%
4	298	\$46,336.65	8%	1,465	\$61,261	43%
5	88	\$30,699.81	-28%	1,553	\$59,529	39%
6	2,106	\$30,420.16	-29%	3,659	\$42,775	0%
7	4	\$4,186.43	-90%	3,663	\$42,733	0%
Total	3,663	\$42,732.90	0%			

Model 2



12 Month Sales up
to November 2019
between \$30,000
and \$300,000

The diagram consists of two chevron-shaped boxes pointing from left to right. The first box is dark blue and contains the text '12 Month Sales up to November 2019 between \$30,000 and \$300,000'. The second box is light blue and contains the text '16.5% of Advisors'. The two boxes are connected by a white arrow pointing from the first box to the second box.

16.5% of
Advisors

Model 2- Positive Influencers

Independent Variables

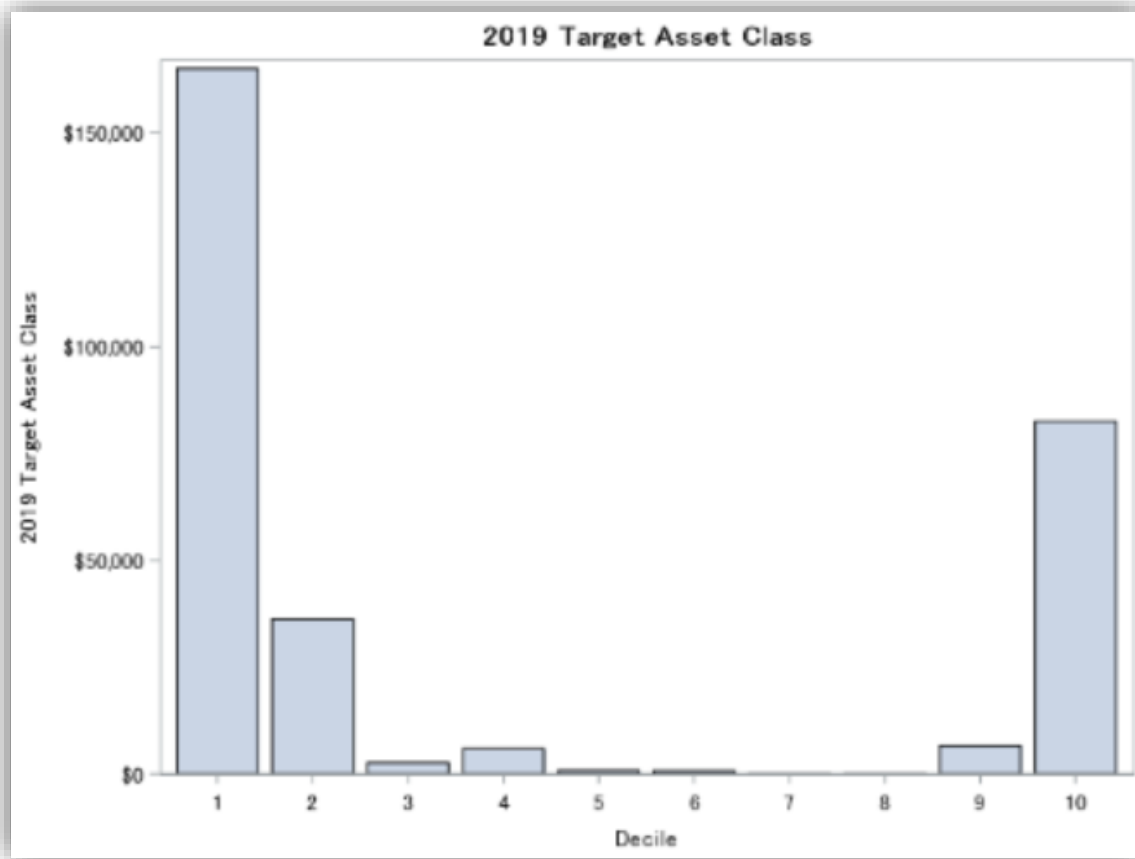
- 12-month sales up to November 2018
- Assets under management in target funds of Nov. 2019

Model 2- Negative Influencers

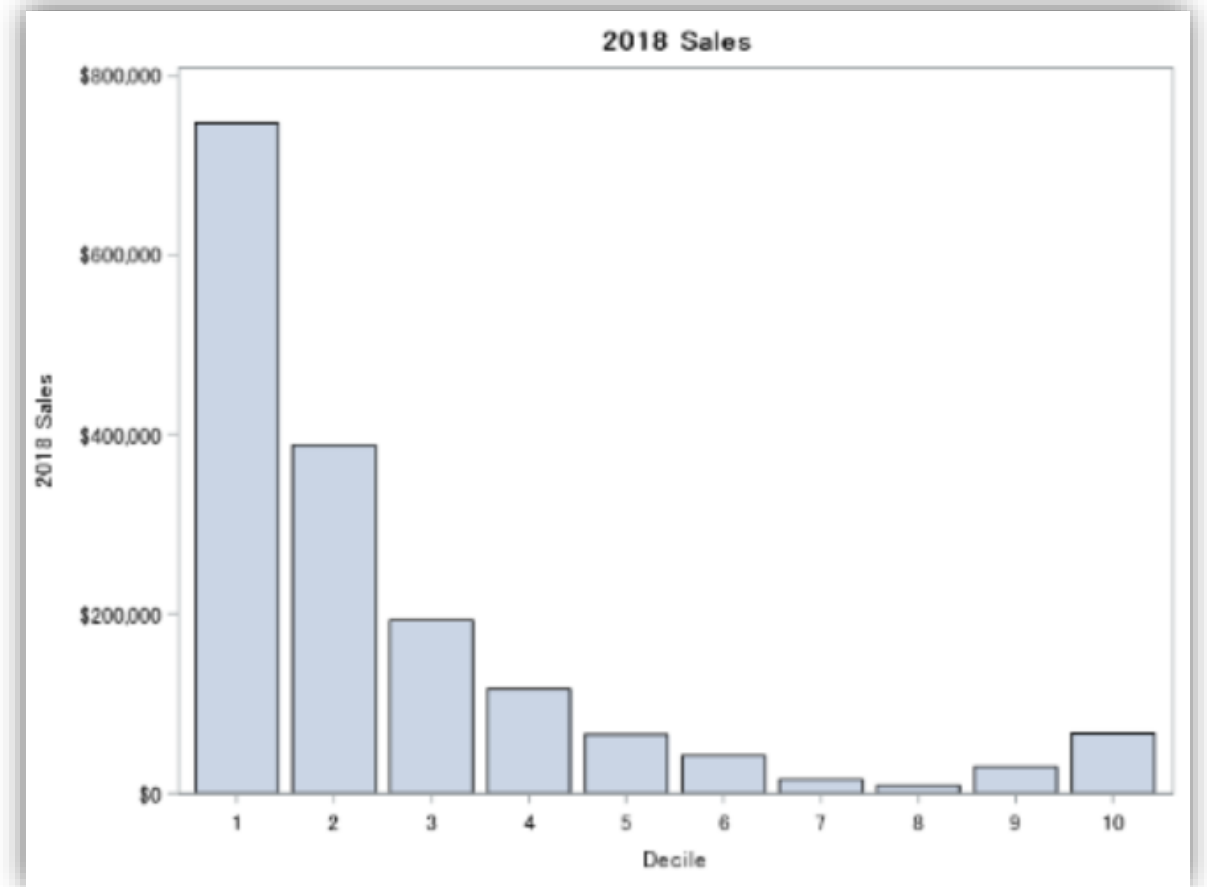
Independent Variable

- Assets under management in target funds of Nov. 2018
- Number of asset classes sold up to November 2019 for at least \$1

Model 2 - Variables



Advisors in deciles 1 manage more Target Fund Assets in 2019



Advisors in decile 1 and 2 had much higher Sales in 2018

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	82	\$341,821.52	84%	82	\$341,822	84%
2	82	\$186,544.00	0%	164	\$264,183	42%
3	83	\$153,121.06	-18%	247	\$226,862	22%
4	82	\$209,868.66	13%	329	\$222,627	20%
5	83	\$114,762.64	-38%	412	\$200,897	8%
6	82	\$148,791.15	-20%	494	\$192,248	3%
7	38	\$58,677.94	-68%	532	\$182,707	-2%
8	127	\$217,698.38	17%	659	\$189,451	2%
9	83	\$176,247.00	-5%	742	\$187,974	1%
10	82	\$170,777.79	-8%	824	\$186,262	0%
Total	824	\$186,262.33	0%			

Model 3



12 Month Sales
up to November
2019 greater
than \$300,000

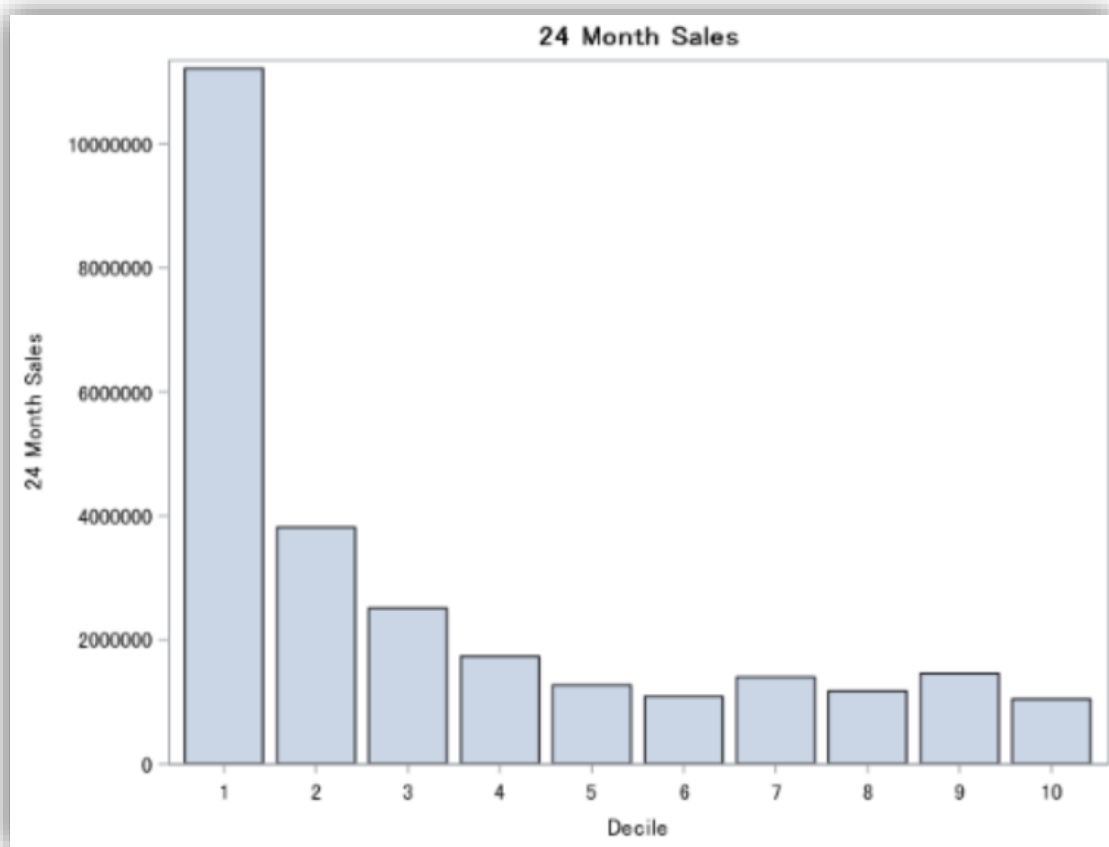
10.3% of
Advisors

Model 3- Positive Influencers

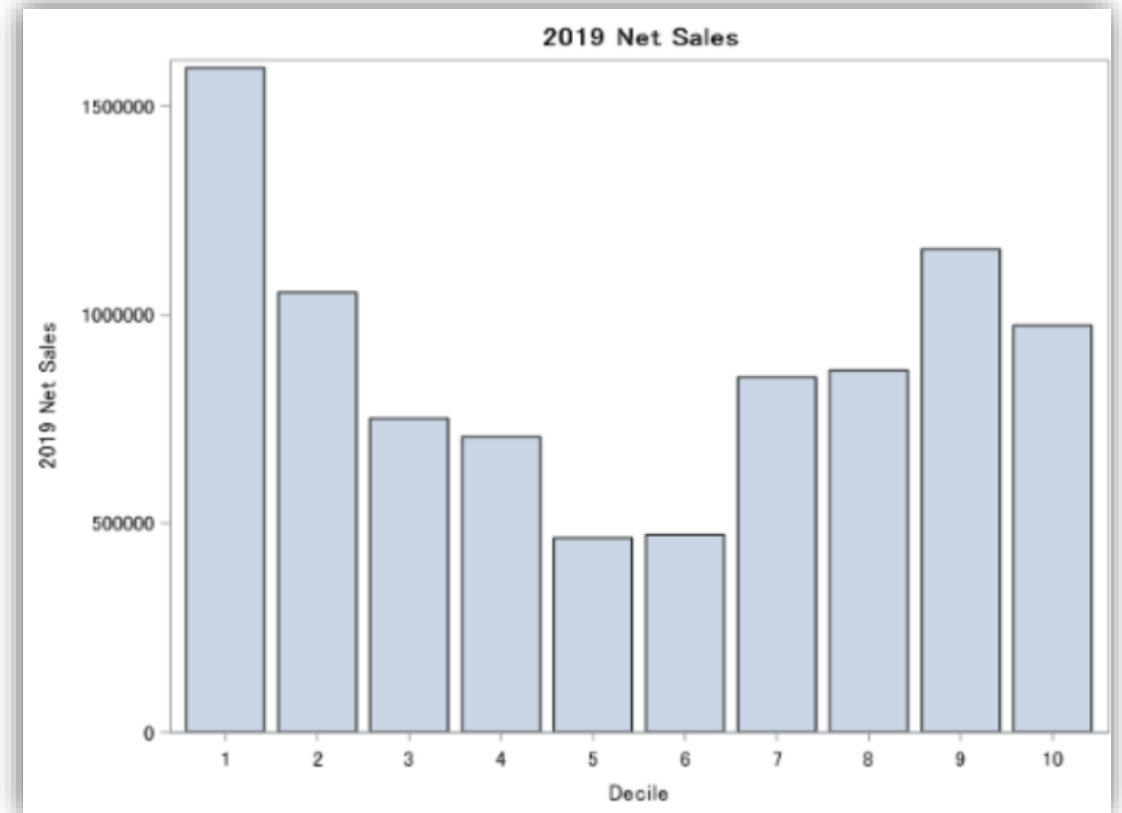
Independent Variables

- 12-month sales up to November 2018
- Assets under management in target funds of Nov. 2018
- Assets under management in target funds of Nov. 2019
- Number of asset classes sold up to November 2019 for at least \$1

Model 3 - Variables



Advisors in decile 1 have much more Sales over the 24-month period

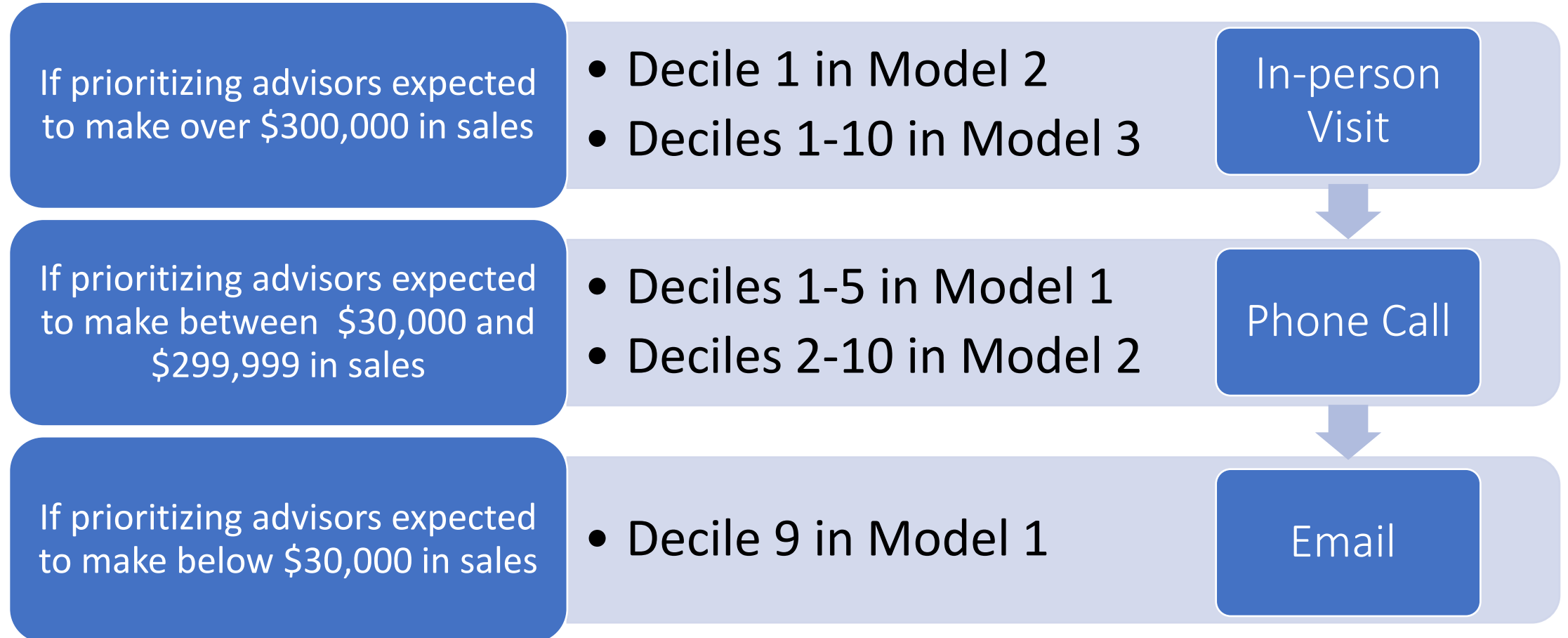


Advisors in decile 1 had much higher Net Sales in 2019

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	51	\$3,453,406.21	175%	51	\$3,453,406	175%
2	52	\$2,509,933.09	100%	103	\$2,977,090	137%
3	52	\$2,358,487.66	88%	155	\$2,769,559	120%
4	52	\$688,445.47	-45%	207	\$2,246,767	79%
5	51	\$766,560.12	-39%	258	\$1,954,168	56%
6	52	\$778,235.39	-38%	310	\$1,756,915	40%
7	52	\$709,016.03	-44%	362	\$1,606,388	28%
8	52	\$655,366.21	-48%	414	\$1,486,936	18%
9	52	\$347,083.93	-72%	466	\$1,359,742	8%
10	51	\$311,535.04	-75%	517	\$1,256,341	0%
Total	517	\$1,256,340.61	0%			

Recommendations



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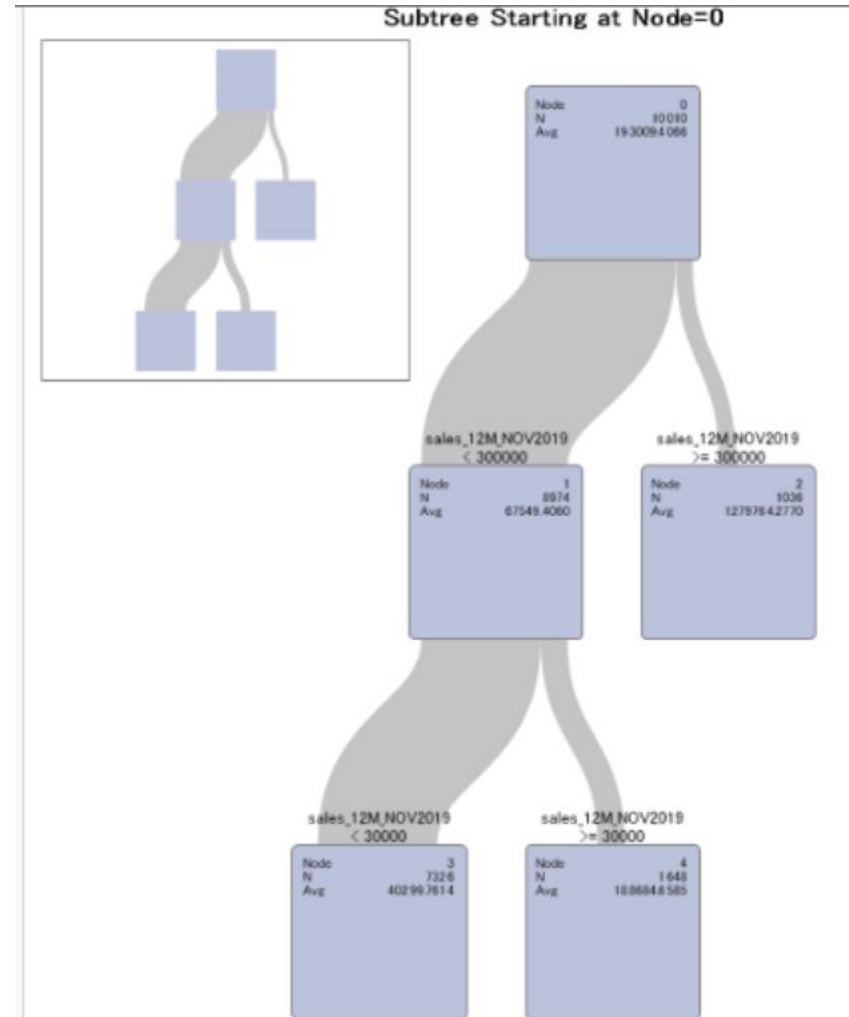
Thank you!

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Appendix

Decision Tree



The SAS System

The HPSPLIT Procedure

Model-Based Fit Statistics for Selected Tree

N Leaves	ASE	RSS
3	8.524E11	8.533E15

Node Information

ID	Path	Training Data	
		Count	Pred
2	Root Node	10010	193009
	sales_12M_NOV2019 >= 300000	1036	127976.4
3	Root Node	10010	193009
	sales_12M_NOV2019 < 300000 or Missing	8974	67549.4
	sales_12M_NOV2019 < 30000 or Missing	7326	40299.8
4	Root Node	10010	193009
	sales_12M_NOV2019 < 300000 or Missing	8974	67549.4
	sales_12M_NOV2019 >= 30000	1648	188685

Variable Importance

Variable	Variable Label	Training		Count
		Relative	Importance	
sales_12M_NOV2019	sales_12M_NOV2019	1.0000	37342045	2

Model 1 (Nuveenlow)

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	28687	9644.96664	2.97	0.0030
aum_AC_TARGET_NOV2018	aum_AC_TARGET_NOV2018	1	-0.84984	0.56156	-1.51	0.1303
sales_12M_NOV2018	sales_12M_NOV2018	1	0.07559	0.05261	1.44	0.1508
aum_AC_TARGET_NOV2019	aum_AC_TARGET_NOV2019	1	1.10748	0.53839	2.06	0.0398
no_of_ac_sold_12M_1_NOV2019	no_of_ac_sold_12M_1_NOV2019	1	16885	13169	1.28	0.1998

Model 2 (Nuveenmiddle)

Parameter Estimates							
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t	
Intercept	Intercept	1	164560	41429	3.97	<.0001	
aum_AC_TARGET_NOV2018	aum_AC_TARGET_NOV2018	1	-2.86086	0.21629	-13.23	<.0001	
sales_12M_NOV2018	sales_12M_NOV2018	1	0.14978	0.06552	2.29	0.0225	
aum_AC_TARGET_NOV2019	aum_AC_TARGET_NOV2019	1	2.76589	0.16297	16.97	<.0001	
no_of_ac_sold_12M_1_NOV2019	no_of_ac_sold_12M_1_NOV2019	1	-6807.72755	21701	-0.31	0.7538	

Model 3 (Nuveenhigh)

Parameter Estimates						
Variable	Label	DF	Parameter Estimate	Standard Error	t Value	Pr > t
Intercept	Intercept	1	355286	221779	1.60	0.1098
aum_AC_TARGET_NOV2018	aum_AC_TARGET_NOV2018	1	0.13842	0.44301	0.31	0.7548
sales_12M_NOV2018	sales_12M_NOV2018	1	0.95579	0.10175	9.39	<.0001
aum_AC_TARGET_NOV2019	aum_AC_TARGET_NOV2019	1	0.28669	0.34018	0.84	0.3998
no_of_ac_sold_12M_1_NOV2019	no_of_ac_sold_12M_1_NOV2019	1	94094	98224	0.96	0.3385