

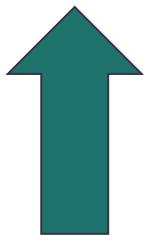
Schnucks Shopaholics

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Xin Wang, Jiren Qi

Agenda

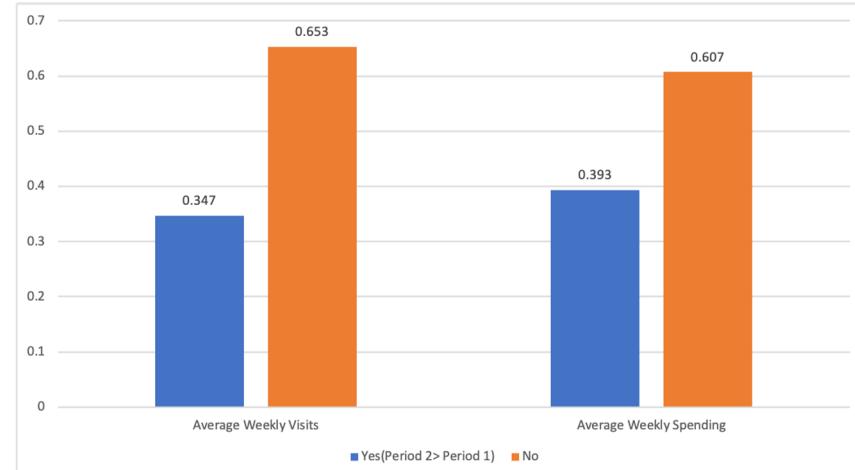
- Key Finding
- Analysis
- Business Insights
- Recommendations
- Appendix

Key Finding



Customers change their Shopping Behavior During Covid

- Data split in 2 periods
 - T1: Jan 2020-June 2020
 - T2: July 2020-Feb 2021
- Examine weekly shopping behavior
- Random sample of 10,414 customers
- Kept only the 10,117 customers appeared in both time periods.
- 34.7% of customers have more weekly visits in period 2
- 39.3 % of customers increase their weekly spending in period 2



Weekly Shopping Trends in Period 1 & 2



- People shop more on Sunday, Friday and Saturday
- In period 2 there was a slight increase in transactions on Wednesday

Methods

Assign MF Scores

- Monetary/Frequency metrics are the most appropriate measurement of customer loyalty
- Monetary Score (M): Average Weekly spending
- Frequency Score (F): Average Weekly Visits
- Each customer is assigned a 2 digit score

Increase in MF Score = Increase in customer loyalty

Clustering on Customers' Shopping Behavior

- 7 clusters
- Clustered shoppers by spending in each shopping department
- Built separate model for each cluster

Model to Predict MF Increase

Outcome Variable

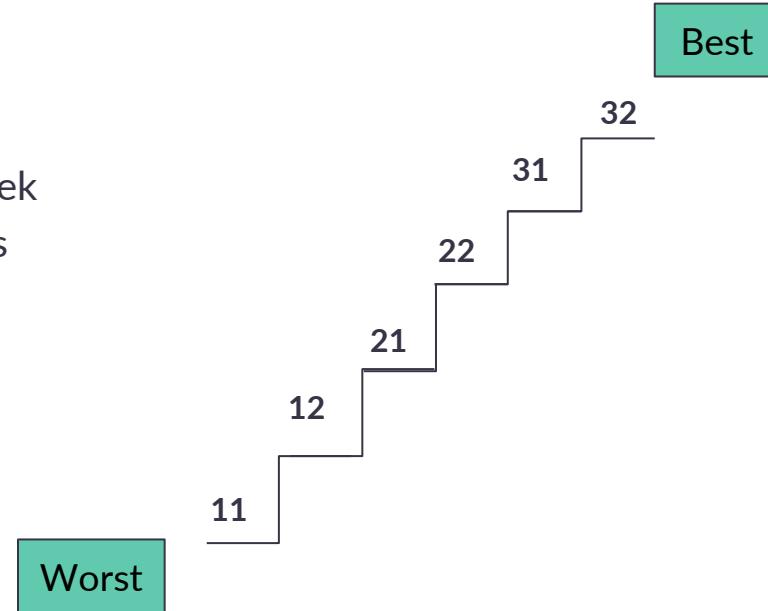
- Logistic model to predict increase in MF score

Input Variables

- Median income, average household size
- Coupon variables
- Payment type
- Weekly sum of sku items bought

Defining Loyalty by Monetary Spend & Shopping Frequency - MF Hierarchy

- Grouped customers by frequency of shopping trips and amount spent per week for a total of 6 Monetary Frequency cells
- 11 is the worst, 32 is the best



MF Analysis: Measuring Customer Loyalty Over time

		T2					
		11	12	21	22	31	32
T1	11	990	350	269	72	30	2
	12	304	959	95	226	9	10
	21	227	104	836	208	275	46
	22	70	239	193	900	64	232
	31	58	12	233	63	1,124	200
	32	19	26	62	222	189	1,199

Most Prevalent Customer MF Movements

		T2					
		11	12	21	22	31	32
T1		11	990	350	269		
		12	304	959			
		21		836		275	
		22		239	900		232
		31		233		1,124	
		32					1,199

Customers Who Increased MF Score



Which Items Predict MF Increase?



K-Means Clustering on Shopping Behavior

Percent of weekly spending per department:

- Bakery
- Dairy
- Drugs
- Alcohol
- Seafood
- Meat & Deli
- Grocery
- Produce
- General Merchandise
- Frozen Food

Percent of weekly spending on Schnucks brand items vs National Brand items

7 clusters:

1. Family with kids
2. Big Drinkers
3. Healthy Adults - like to cook
4. Easy meal lovers - less healthy
5. Likes to entertain/ host parties
6. Schnucks Brand Lovers- shop from every department
7. Other (Families or multi-person house)

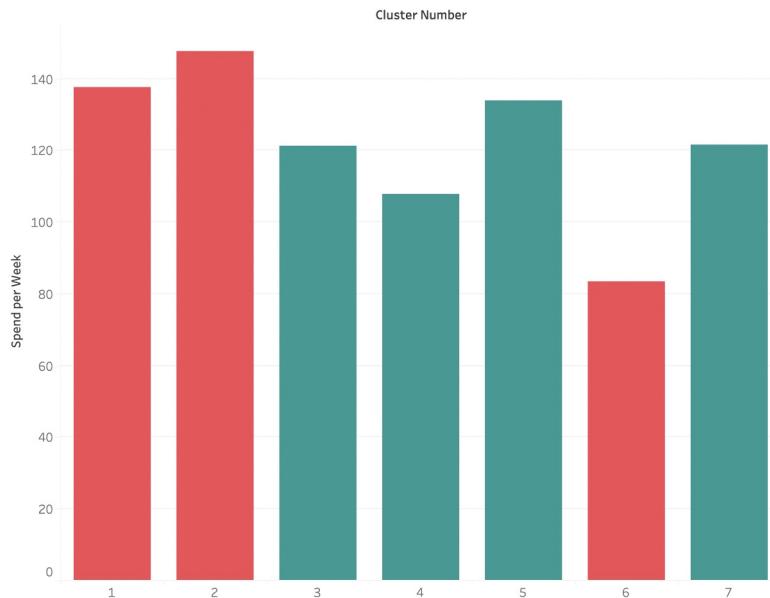


K-Means Clustering on Shopping Behavior

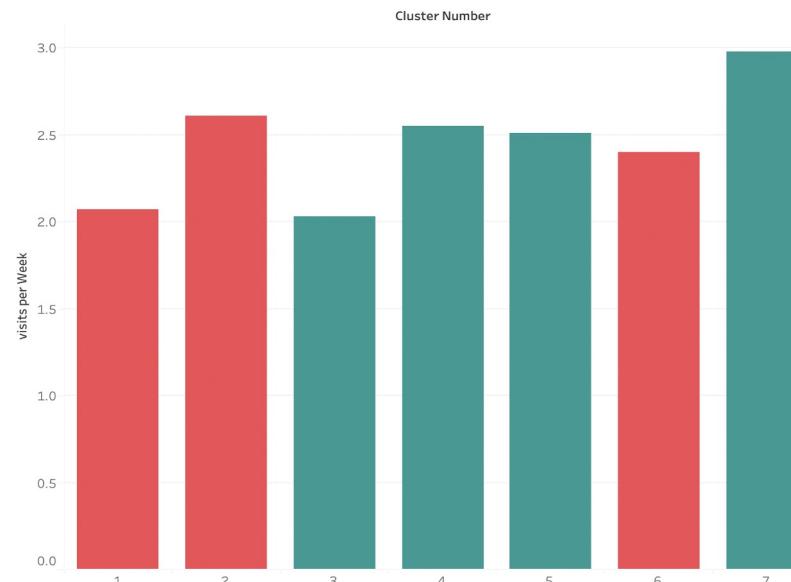
Cluster Name	Bakery	Dairy	Drugs	Liquor	Meat	Grocery	Produce	General Merchandise	Frozen Food	% Schnucks	% National	Cluster Size
Family with kids	2.59%	11.00%	4.05%	5.70%	10.35%	33.00%	13.50%	2.16%	7.98%	22.59%	71.12%	2265
Big Drinkers	1.92%	6.55%	2.84%	35.32%	7.70%	22.91%	8.41%	1.72%	5.07%	17.50%	75.89%	490
Healthy adults - like to cook	3.15%	9.89%	2.36%	4.38%	10.79%	26.53%	24.27%	1.73%	5.45%	36.02%	57.84%	1274
Easy meal lovers - less healthy	2.77%	8.58%	3.24%	3.11%	9.14%	48.66%	7.50%	2.14%	7.29%	21.53%	71.78%	1217
Like to entertain/ host parties	3.19%	8.17%	2.67%	18.11%	12.25%	25.39%	11.68%	1.94%	5.42%	29.49%	63.30%	1297
Schnucks Brand Lovers	6.84%	8.65%	1.87%	3.46%	17.05%	26.76%	12.54%	1.71%	5.63%	49.30%	42.56%	1096
Other	3.80%	9.74%	2.80%	3.04%	14.30%	36.42%	9.97%	2.02%	7.27%	34.64%	57.94%	2775

Spending and Visits by Cluster

Weekly Spend per Cluster



Weekly Visits per Cluster



Business Insights

Significance of Digital Coupons

- Digital Coupons and Personalized Coupons were highly significant for every cluster
- Indicates connection between receiving a coupon and increasing loyalty
- An increase in app usage could lead to even more loyalty

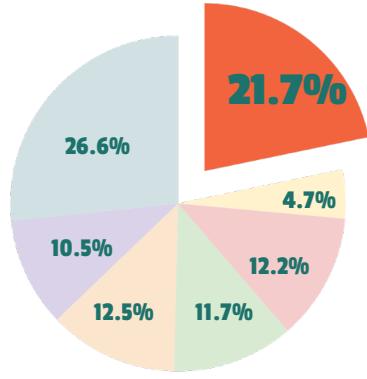
Example regression output from Cluster 6 (Schnucks Brand Lovers)

Deviance Residuals:

	Min	1Q	Median	3Q	Max
	-1.5973	-0.7306	-0.6706	-0.5384	2.3920

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-8.508e-01	1.227e-01	-6.932	4.16e-12 ***
personalized_coupons_received	2.509e-02	5.657e-03	4.435	9.20e-06 ***
redeemed_personal_coupons	1.185e-01	2.239e-02	5.291	1.21e-07 ***
digital_coupons_received	-1.449e-01	1.653e-02	-8.769	< 2e-16 ***
redeemed_digital_coupons	-1.166e-01	4.160e-02	-2.802	0.005086 **
Median_income	-4.024e-06	5.690e-07	-7.072	1.53e-12 ***
paymentCREDIT CARD	-1.844e-01	5.734e-02	-3.216	0.001300 **
paymentCREDIT CARDLOYALTY	7.676e-02	7.061e-02	1.087	0.276980
paymentDEBIT CARD	4.387e-02	5.501e-02	0.797	0.425238
paymentDEBIT CARD,LOYALTY	1.847e-02	7.017e-02	0.263	0.792361
paymentOTHER	-1.613e-01	6.102e-02	-2.643	0.008212 **
paymentSNAP	2.174e-01	7.407e-02	2.935	0.003338 **
Average.Household.Size	-3.005e-03	5.231e-02	-0.057	0.954186
weekly_beers	-2.224e-01	6.139e-02	-3.622	0.000292 ***
weekly_sodas	2.770e-02	6.805e-03	4.070	4.69e-05 ***
weekly_spirits	1.837e-02	1.862e-02	0.986	0.324015
weekly_sparkling_ice	-3.002e-02	1.496e-02	-2.007	0.044720 *
weekly_baby_formula	-7.456e-03	2.549e-02	-0.293	0.769893
weekly_blackberries	-6.369e-03	2.579e-02	-0.247	0.804957
weekly_cat_food	-3.082e-02	1.174e-02	-2.627	0.008622 **
weekly_eckerts_peaches	-1.251e-01	6.779e-02	-1.846	0.064904 .
weekly_donations	2.005e-02	3.279e-02	0.611	0.540895
weekly_bud_ice	2.011e-01	3.279e-01	0.613	0.539764
weekly_diet_pepsi	2.140e-01	4.920e-02	4.350	1.36e-05 ***
weekly_ground_beef	-3.472e-01	3.842e-01	-0.904	0.366192
weekly_sweet_potatoe	-6.593e-02	4.908e-02	-1.343	0.179170

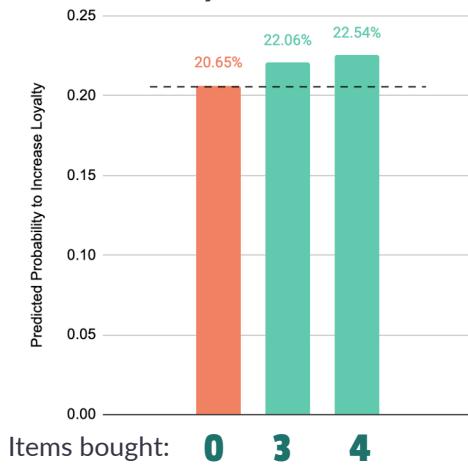


Cluster 1: Families with Kids

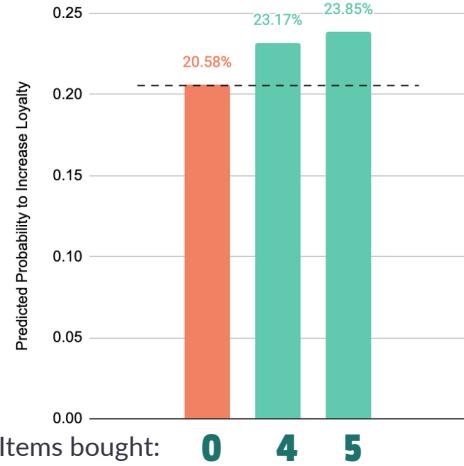
Buy the most dairy (11%)
 Buy the most frozen food (8%)
 Buy many groceries (33%)
 71% national brands



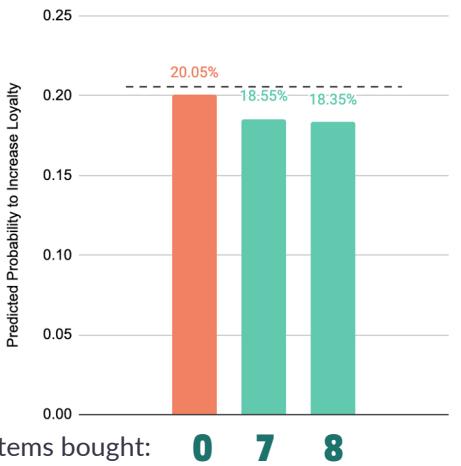
Baby Formula



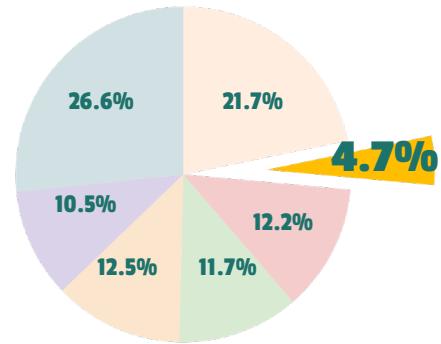
Spirits



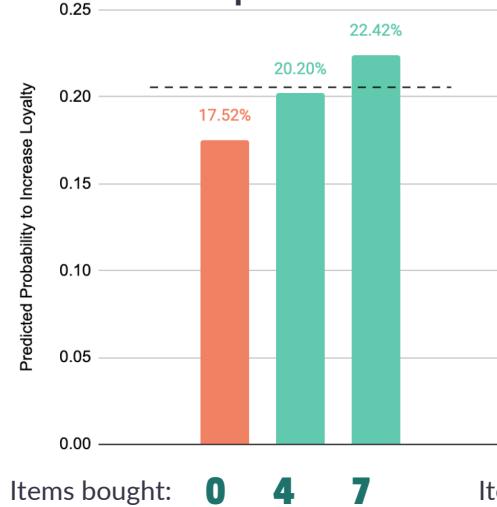
Cat Food



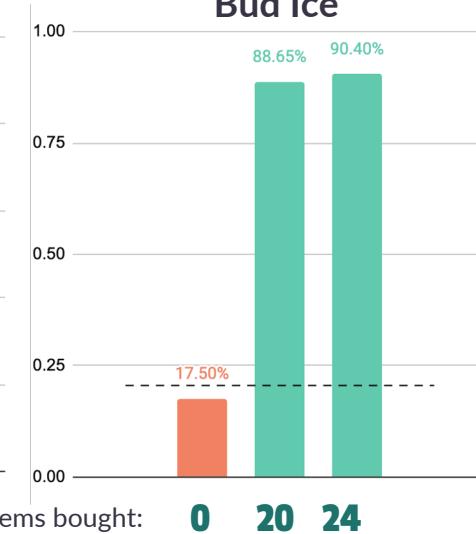
Cluster 2: Big Drinkers



Spirits



Bud Ice

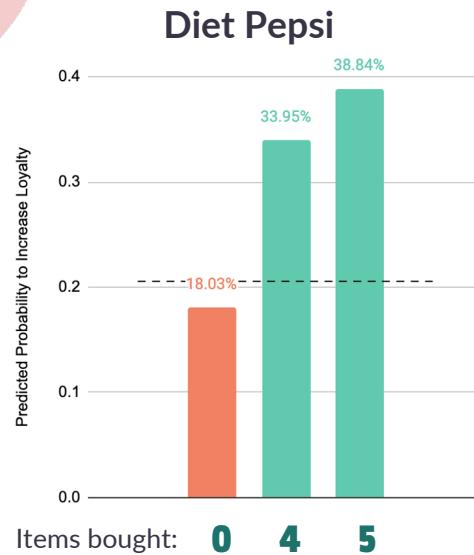
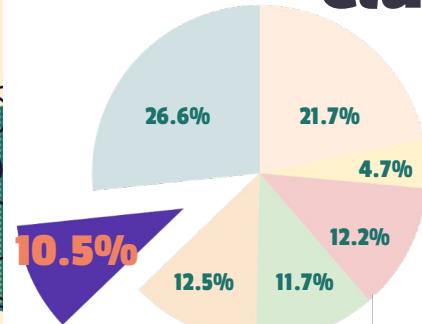


Buy the most alcohol (35%)
Buy the lowest everything else
76% national brands

Cluster 6: Schnucks Brand Lovers



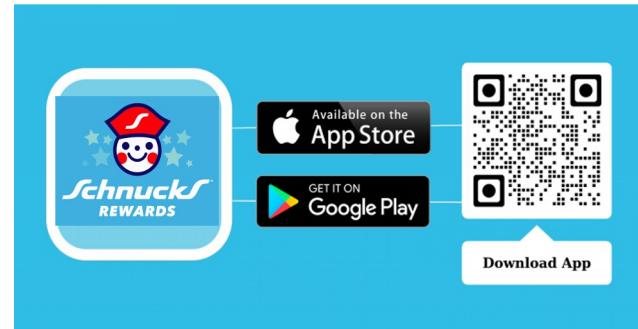
stars



Shops from every department
Buy the most bakery items (7%)
49% Schnucks brands

Recommendations

1. Tailor promotions based on cluster membership
 - o Coupons for specified items:
 - i. 20% price cut
 - ii. Buy 4 get the 5th free
 - iii. Buy 10 for \$1 each
 - o Offer coupons during middle of week
2. Add QR codes to in-store advertising to encourage people to download the app
 - o Offer a coupon to people who download the app and sign up
3. Create an app referral system
 - o Give customers points/ rewards for getting others to sign up



Potential Interference

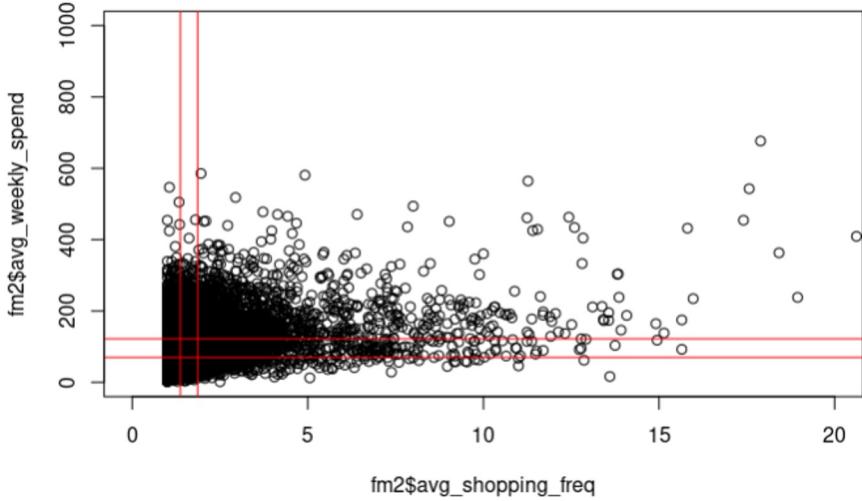
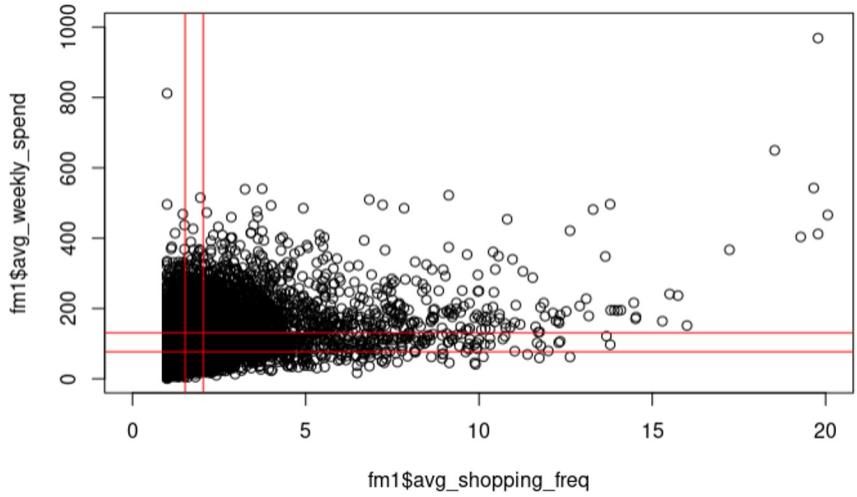
1. Instacart shoppers
2. As bars and restaurants open back up, people may buy less alcohol at Schnucks
3. Shopping trends are always changing
4. We looked at a sample of customers



Thanks!

Appendix

MF Analysis: Spending and Visits



Finding Items Disproportionately Bought By Increases

```
increased_customer = target_customer_full[which(target_customer_full$sso_user_id %in% customer_increased),]  
customer_increased = levels(as.factor(increased_customer$sso_user_id))  
sku_pop = increased_customer %>% group_by(sku) %>% summarise(sku_count=n()) %>% arrange(desc(sku))  
sku_pop  
sku_pop[-1] = apply(sku_pop[-1], 2, function(x){x/sum(x)})  
  
not_increased = target_customer_full[-which(target_customer_full$sso_user_id %in% customer_increased),]  
sku_pop_full = not_increased %>% group_by(sku) %>% summarise(sku_count=n()) %>% arrange(desc(sku))  
sku_pop_full  
sku_pop_full[-1] = apply(sku_pop_full[-1], 2, function(x){x/sum(x)})  
  
joined = left_join(sku_pop, sku_pop_full, by="sku")  
joined  
  
joined$perc_diff = joined$sku_count.x - joined$sku_count.y  
joined %>% arrange(desc(perc_diff))
```

```
#Most popular items:  
#Bud ICE 250Z  
#WILD TURKEY AM HONEY  
#DEEP EDDY LEMON VODKA  
#PEPSI DT 6PK 500ML  
#DONATIONS  
#BLACKBERRIES 12/ 6 OZ  
#SPKLNG ICE PINK GRAPFRUIT  
#RED RASPBERRIES 12/6 OZ  
#FIREBALL WHSKY CINN PET  
#RIPE BANANAS  
#SLEEVED CELERY  
#RED SEEDLESS GRAPES  
#COKE ZERO 2LT  
#SCH 2% RED FAT MLK HGAL  
#ECKERTS PEACHES  
#SPKLNG ICE LEMON LIME  
#SPKLNG ICE KIWI STRWBRY  
#SPKLNG ICE STRW LEMONAD  
#5 SCHNUCK PREM RUSSET  
#SPKLNG ICE POM BLUEBERRY
```

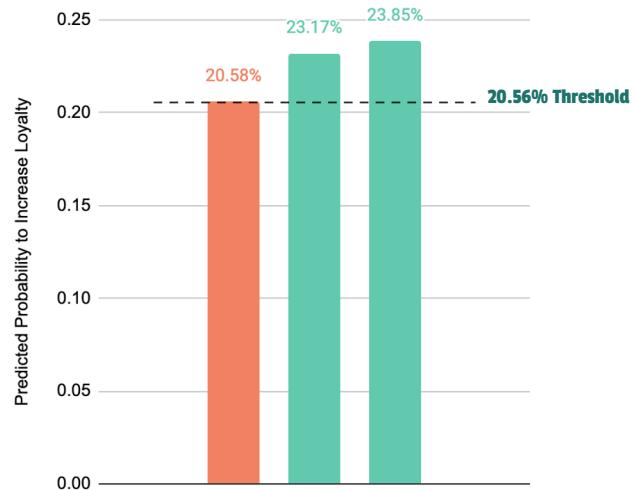
Cluster 1 - spirits - significant xtile

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.359e+00	9.040e-02	-15.033	< 2e-16 ***
personalized_coupons_received	1.289e-02	3.674e-03	3.508	0.000451 ***
redeemed_personal_coupons	-4.631e-03	1.679e-02	-0.276	0.782689
digital_coupons_received	-6.893e-02	1.320e-02	-5.221	1.78e-07 ***
redeemed_digital_coupons	1.460e-02	3.284e-02	0.445	0.656580
Median_income	-1.979e-06	3.449e-07	-5.738	9.60e-09 ***
paymentCREDIT CARD	-1.010e-01	5.623e-02	-1.796	0.072431 .
paymentCREDIT CARD, LOYALTY	-1.244e-01	5.891e-02	-2.112	0.034678 *
paymentDEBIT CARD	-1.588e-01	5.577e-02	-2.848	0.004396 **
paymentDEBIT CARD, LOYALTY	-1.120e-01	6.035e-02	-1.855	0.063593 .
paymentOTHER	-1.627e-01	5.870e-02	-2.772	0.005566 **
paymentSNAP	-5.514e-01	9.172e-02	-6.012	1.83e-09 ***
Average.Household.Size	1.538e-01	3.533e-02	4.354	1.34e-05 ***
weekly_beers	-6.895e-02	2.512e-02	-2.744	0.006063 **
weekly_sodas	-1.792e-02	4.946e-03	-3.624	0.000290 ***
weekly_sparkling_ice	9.028e-03	6.454e-03	1.399	0.161846
weekly_baby_formula	2.833e-02	1.024e-02	2.766	0.005683 **
weekly_blackberries	-4.680e-02	1.478e-02	-3.167	0.001542 **
weekly_cat_food	-1.486e-02	6.421e-03	-2.315	0.020612 *
weekly_eckerts_peaches	-2.371e-03	4.399e-02	-0.054	0.957021
weekly_donations	2.653e-02	2.052e-02	1.293	0.196073
weekly_spirits_xtile3	1.749e-01	6.156e-02	2.841	0.004499 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

avg_prob_before <dbl>	avg_prob_4 <dbl>	avg_prob_5 <dbl>
0.2057608	0.2316795	0.2385364



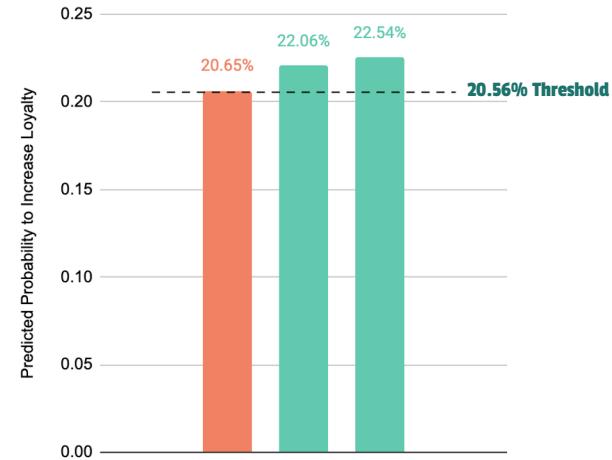
Cluster 1 - baby formula - xtile is insignificant but increases still observed from simulation

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.354e+00	9.040e-02	-14.978	< 2e-16 ***
personalized_coupons_received	1.295e-02	3.675e-03	3.525	0.000424 ***
redeemed_personal_coupons	-4.392e-03	1.680e-02	-0.261	0.793724
digital_coupons_received	-6.896e-02	1.320e-02	-5.223	1.76e-07 ***
redeemed_digital_coupons	1.285e-02	3.289e-02	0.391	0.696001
Median_income	-2.004e-06	3.450e-07	-5.810	6.24e-09 ***
paymentCREDIT CARD	-1.019e-01	5.623e-02	-1.811	0.070071 .
paymentCREDIT CARD,LOYALTY	-1.245e-01	5.891e-02	-2.114	0.034545 *
paymentDEBIT CARD	-1.595e-01	5.577e-02	-2.859	0.004248 **
paymentDEBIT CARD,LOYALTY	-1.128e-01	6.035e-02	-1.868	0.061695 .
paymentOTHER	-1.580e-01	5.869e-02	-2.692	0.007096 **
paymentSNAP	-5.433e-01	9.175e-02	-5.921	3.19e-09 ***
Average.Household.Size	1.536e-01	3.533e-02	4.348	1.37e-05 ***
weekly_beers	-6.719e-02	2.500e-02	-2.687	0.007199 **
weekly_sodas	-1.781e-02	4.939e-03	-3.605	0.000312 ***
weekly_spirits	3.852e-02	9.057e-03	4.253	2.11e-05 ***
weekly_sparkling_ice	8.730e-03	6.456e-03	1.352	0.176270
weekly_blackberries	-4.704e-02	1.478e-02	-3.182	0.001464 **
weekly_cat_food	-1.489e-02	6.421e-03	-2.319	0.020368 *
weekly_eckerts_peaches	-4.148e-03	4.400e-02	-0.094	0.924901
weekly_donations	2.735e-02	2.051e-02	-1.333	0.182456
weekly_baby_formula_xtile3	-1.354e-01	9.171e-02	-1.476	0.139868

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

avg_prob_before	avg_prob_3	avg_prob_4
0.2064552	0.2205553	0.225419



Cluster 1 - cat food

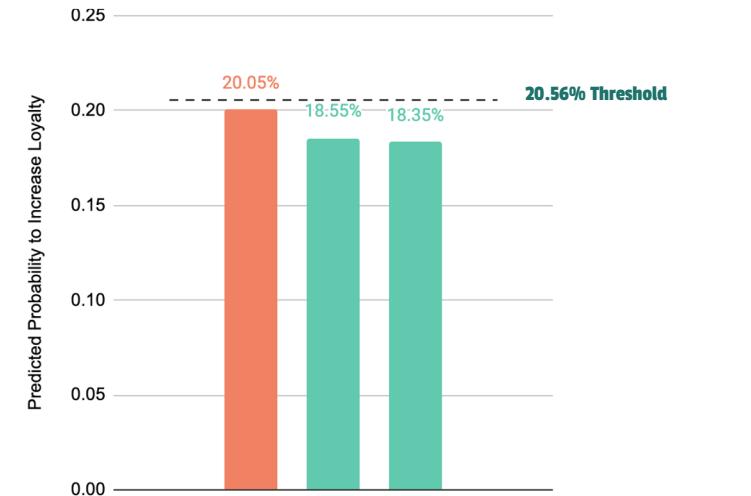
xtile is significant but negative

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.363e+00	9.042e-02	-15.075	< 2e-16 ***
personalized_coupons_received	1.298e-02	3.675e-03	3.533	0.000411 ***
redeemed_personal_coupons	-4.685e-03	1.679e-02	-0.279	0.780196
digital_coupons_received	-6.846e-02	1.320e-02	-5.187	2.14e-07 ***
redeemed_digital_coupons	1.355e-02	3.285e-02	0.412	0.679998
Median_income	-2.005e-06	3.450e-07	-5.812	6.16e-09 ***
paymentCREDIT CARD	-1.009e-01	5.624e-02	-1.795	0.072702 .
paymentCREDIT CARD, LOYALTY	-1.223e-01	5.892e-02	-2.076	0.037848 *
paymentDEBIT CARD	-1.568e-01	5.578e-02	-2.811	0.004946 **
paymentDEBIT CARD, LOYALTY	-1.064e-01	6.037e-02	-1.762	0.078009 .
paymentOTHER	-1.615e-01	5.871e-02	-2.750	0.005951 **
paymentSNAP	-5.535e-01	9.172e-02	-6.035	1.59e-09 ***
Average.Household.Size	1.576e-01	3.535e-02	4.459	8.24e-06 ***
weekly_beers	-7.007e-02	2.508e-02	-2.794	0.005212 **
weekly_sodas	-1.818e-02	4.941e-03	-3.679	0.000234 ***
weekly_spirits	3.823e-02	9.051e-03	4.224	2.40e-05 ***
weekly_sparkling_ice	8.668e-03	6.459e-03	1.342	0.179630
weekly_baby_formula	2.793e-02	1.024e-02	2.728	0.006372 **
weekly_blackberries	-4.704e-02	1.479e-02	-3.180	0.001471 **
weekly_eckerts_peaches	-2.555e-03	4.400e-02	-0.058	0.953687
weekly_donations	2.652e-02	2.052e-02	1.293	0.196177
weekly_cat_food_xtile3	-3.291e-01	6.496e-02	-5.066	4.06e-07 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

avg_prob_before	avg_prob_7	avg_prob_8
0.200515	0.1855483	0.1834659



What Variables Predict MF Increase? -

cluster 2 bud ice simulation

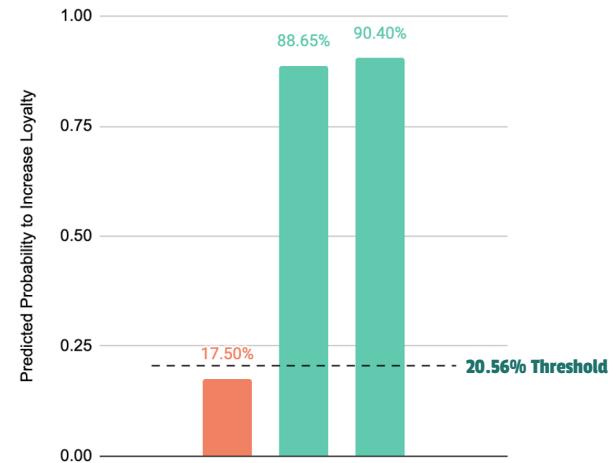
Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.647e+00	2.346e-01	-15.543	< 2e-16 ***
personalized_coupons_received	2.039e-02	7.687e-03	2.652	0.007995 **
redeemed_personal_coupons	5.597e-02	3.840e-02	1.457	0.144990
digital_coupons_received	9.878e-02	2.078e-02	4.754	2.00e-06 ***
redeemed_digital_coupons	2.428e-02	6.639e-02	0.366	0.714602
Median_income	-5.937e-06	7.406e-07	-8.017	1.09e-15 ***
paymentCREDIT CARD	5.344e-01	1.604e-01	3.332	0.000863 ***
paymentCREDIT CARD,LOYALTY	4.496e-01	1.671e-01	2.690	0.007141 **
paymentDEBIT CARD	5.548e-01	1.595e-01	3.477	0.000506 ***
paymentDEBIT CARD,LOYALTY	3.846e-01	1.686e-01	2.282	0.022509 *
paymentOTHER	7.444e-01	1.648e-01	4.517	6.26e-06 ***
paymentSNAP	8.300e-01	2.245e-01	3.697	0.000219 ***
Average.Household.Size	8.860e-01	8.437e-02	10.502	< 2e-16 ***
weekly_beers	2.032e-01	1.776e-02	11.439	< 2e-16 ***
weekly_sodas	-5.775e-02	1.038e-02	-5.566	2.61e-08 ***
weekly_spirits	4.496e-02	5.048e-03	8.906	< 2e-16 ***
weekly_sparkling_ice	6.908e-02	3.486e-02	1.982	0.047500 *
weekly_baby_formula	1.840e-01	1.006e-01	1.830	0.067234 .
weekly_blackberries	-5.451e-02	5.358e-02	-1.017	0.308945
weekly_cat_food	4.344e-03	9.008e-03	0.482	0.629608
weekly_eckerts_peaches	3.423e-01	8.608e-02	3.976	7.01e-05 ***
weekly_donations	-1.374e-02	4.052e-02	-0.339	0.734495
weekly_diet_pepsi	-3.444e-01	3.627e-01	-0.949	0.342399
weekly_ground_beef	1.273e+01	8.964e+01	0.142	0.887051
weekly_sweet_potatoe	1.167e-01	8.319e-02	1.403	0.160613
weekly_bud_xtile3	-1.556e+00	3.869e-01	-4.022	5.77e-05 ***

#Bud Ice seems to make customers very valuable if they buy more 18

...

avg_prob_before	avg_prob_20	avg_prob_24
0.1749951	0.8864694	0.9039562



What Variables Predict MF Increase? -

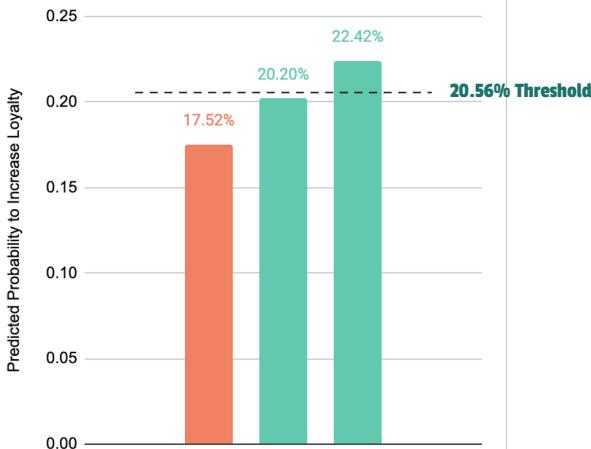
cluster 2 spirits simulation

Coefficients:

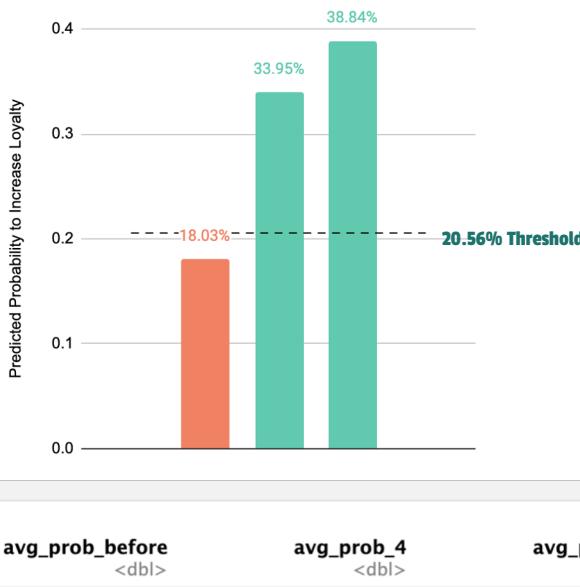
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.596e+00	2.343e-01	-15.351	< 2e-16 **
personalized_coupons_received	1.686e-02	7.639e-03	2.207	0.027322 *
redeemed_personal_coupons	5.809e-02	3.851e-02	1.508	0.131431
digital_coupons_received	9.043e-02	2.078e-02	4.351	1.35e-05 **
redeemed_digital_coupons	2.174e-02	6.640e-02	0.327	0.743409
Median_income	-5.574e-06	7.376e-07	-7.557	4.13e-14 **
paymentCREDIT_CARD	5.377e-01	1.607e-01	3.347	0.000818 **
paymentCREDIT_CARD,LOYALTY	4.553e-01	1.674e-01	2.721	0.006513 **
paymentDEBIT_CARD	5.708e-01	1.598e-01	3.573	0.000353 ***
paymentDEBIT_CARD,LOYALTY	3.974e-01	1.688e-01	2.355	0.018539 *
paymentOTHER	7.911e-01	1.648e-01	4.800	1.59e-06 ***
paymentSNAP	7.873e-01	2.252e-01	3.497	0.000471 ***
Average.Household.Size	8.484e-01	8.401e-02	10.099	< 2e-16 ***
weekly_beers	1.959e-01	1.878e-02	10.431	< 2e-16 ***
weekly_sodas	-4.937e-02	9.442e-03	-5.228	1.71e-07 ***
weekly_sparkling_ice	7.225e-02	3.455e-02	2.091	0.036497 *
weekly_baby_formula	1.831e-01	1.007e-01	1.818	0.069095 .
weekly_blackberries	-6.747e-02	5.370e-02	-1.256	0.208941
weekly_cat_food	1.982e-03	8.945e-03	0.222	0.824602
weekly_eckerts_peaches	3.134e-01	8.426e-02	3.719	0.000200 ***
weekly_donations	-1.666e-02	4.043e-02	-0.412	0.680375
weekly_bud_ice	-1.149e-02	5.331e-02	-0.216	0.829330
weekly_diet_pepsi	-3.871e-01	3.773e-01	-1.026	0.304979
weekly_ground_beef	1.275e+01	8.965e+01	0.142	0.886870
weekly_sweet_potatoe	8.359e-02	8.235e-02	1.088	0.276622
weekly_spirits_xtile3	3.849e-01	5.958e-02	6.460	1.05e-10 ***

#Going from 3 to 4 spirits increases the likelihood of increasing fm score into the threshold.

avg_prob_before	avg_prob_4	avg_prob_7
<dbl>	<dbl>	<dbl>



Cluster 6 - Diet Pepsi



	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-8.527e-01	1.228e-01	-6.946	3.76e-12 ***
personalized_coupons_received	2.523e-02	5.655e-03	4.461	8.16e-06 ***
redeemed_personal_coupons	1.184e-01	2.239e-02	5.290	1.22e-07 ***
digital_coupons_received	-1.449e-01	1.653e-02	-8.766	< 2e-16 ***
redeemed_digital_coupons	-1.168e-01	4.162e-02	-2.806	0.005009 **
Median_income	-4.020e-06	5.691e-07	-7.064	1.62e-12 ***
paymentCREDIT CARD	-1.853e-01	5.736e-02	-3.231	0.001232 **
paymentCREDIT CARD,LOYALTY	7.736e-02	7.060e-02	1.096	0.273184
paymentDEBIT CARD	4.370e-02	5.502e-02	0.794	0.427097
paymentDEBIT CARD,LOYALTY	1.696e-02	7.018e-02	0.242	0.809055
paymentOTHER	-1.602e-01	6.102e-02	-2.625	0.008654 **
paymentSNAP	2.147e-01	7.410e-02	2.898	0.003757 **
Average.Household.Size	-3.178e-03	5.231e-02	-0.061	0.951551
weekly_beers	-2.220e-01	6.138e-02	-3.617	0.000298 ***
weekly_sodas	2.911e-02	6.683e-03	4.356	1.33e-05 ***
weekly_spirits	1.761e-02	1.865e-02	0.944	0.345088
weekly_sparkling_ice	-2.991e-02	1.495e-02	-2.001	0.045444 *
weekly_baby_formula	-7.438e-03	2.546e-02	-0.292	0.770207
weekly_blackberries	-6.943e-03	2.581e-02	-0.269	0.787968
weekly_cat_food	-3.064e-02	1.171e-02	-2.617	0.008865 **
weekly_eckerts_peaches	-1.177e-01	6.714e-02	-1.752	0.079690 .
weekly_donations	1.883e-02	3.277e-02	0.575	0.565498
weekly_bud_ice	2.019e-01	3.279e-01	0.616	0.538199
weekly_ground_beef	-3.470e-01	3.843e-01	-0.903	0.366483
weekly_sweet_potatoe	5.794e-02	4.838e-02	1.197	0.231114
weekly_pepsi_xtile3	1.050e+00	2.123e-01	4.944	7.65e-07 ***

Within each cluster, spend and visits did not increase from T1 to T2

cluster	avg_visit_1	avg_spend_1	avg_visit_2	avg_spend_2	visit	spend
1	2.140255	127.38626	2.001175	119.72230	0	0
2	2.829350	92.85967	2.711490	91.38351	0	0
3	2.014831	128.14444	1.921804	121.21703	0	0
4	2.602016	97.94525	2.478056	92.54857	0	0
5	2.942036	126.51697	2.729806	118.26768	0	0
6	2.733177	145.14601	2.685648	142.90257	0	0
7	2.633075	136.46991	2.568377	133.29545	0	0
8	2.566453	139.63681	2.385604	130.84180	0	0

Model: Boosted Trees

Period 1

	var <chr>	rel.inf <dbl>
percent_national	percent_national	33.6885300
percent_schnucks	percent_schnucks	22.5796573
payment	payment	15.4928430
cluster	cluster	8.6129472
Average.Household.Size	Average.Household.Size	8.4084410
Median_income	Median_income	7.4968525
digital_coupons_received	digital_coupons_received	2.6037369
personalized_coupons_received	personalized_coupons_received	0.6006151
redeemed_digital_coupons	redeemed_digital_coupons	0.4045609
redeemed_personal_coupons	redeemed_personal_coupons	0.1118162

Period 2

	var <chr>	rel.inf <dbl>
percent_national	percent_national	21.0790029
payment	payment	20.0377777
percent_schnucks	percent_schnucks	18.8188946
Average.Household.Size	Average.Household.Size	13.1459467
cluster	cluster	12.9477066
Median_income	Median_income	8.2655028
personalized_coupons_received	personalized_coupons_received	3.1857540
digital_coupons_received	digital_coupons_received	1.7923340
redeemed_personal_coupons	redeemed_personal_coupons	0.3639226
redeemed_digital_coupons	redeemed_digital_coupons	0.3631580

- 10,378 customers in period 1
- 10,153 customers in period 2
- Data is normalized between 0 and 1
- Payment levels (comprising over 80% of the data besides other)
 - "DEBIT CARD", "CREDIT CARD", "CREDIT CARD,LOYALTY", "DEBIT CARD,LOYALTY", "CASH", "SNAP", "OTHER"
- Percent_national and percent_schnucks describe how much a customer spends on national brands and schnucks brands weekly