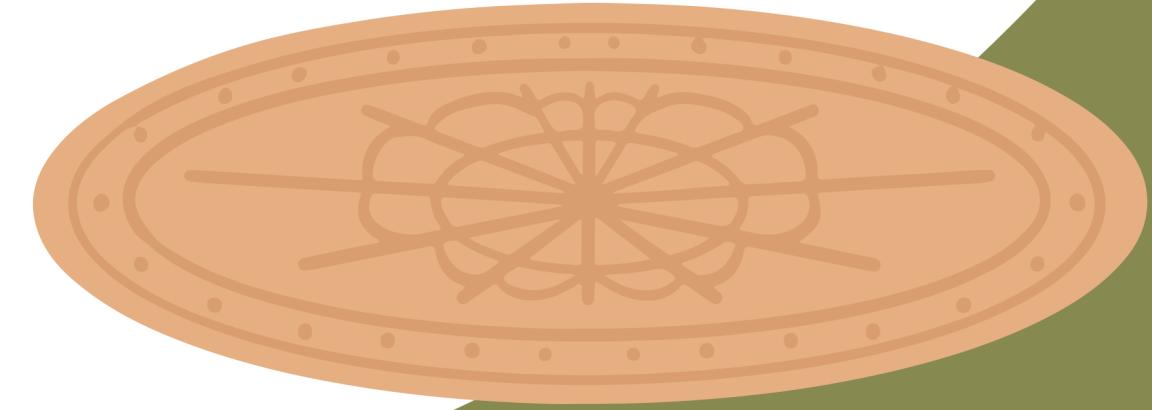
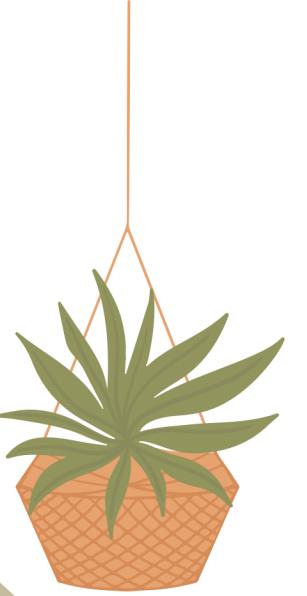
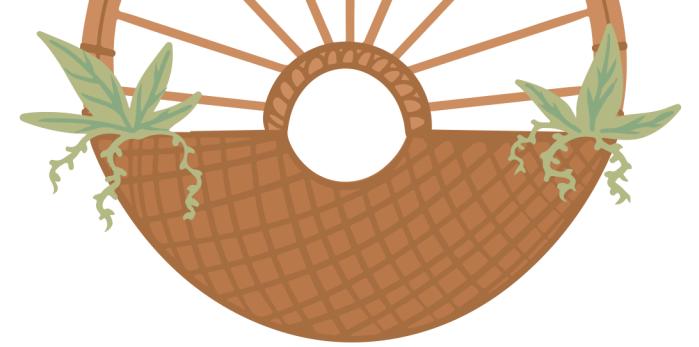


Market Response Modeling at Goodbelly Beverages

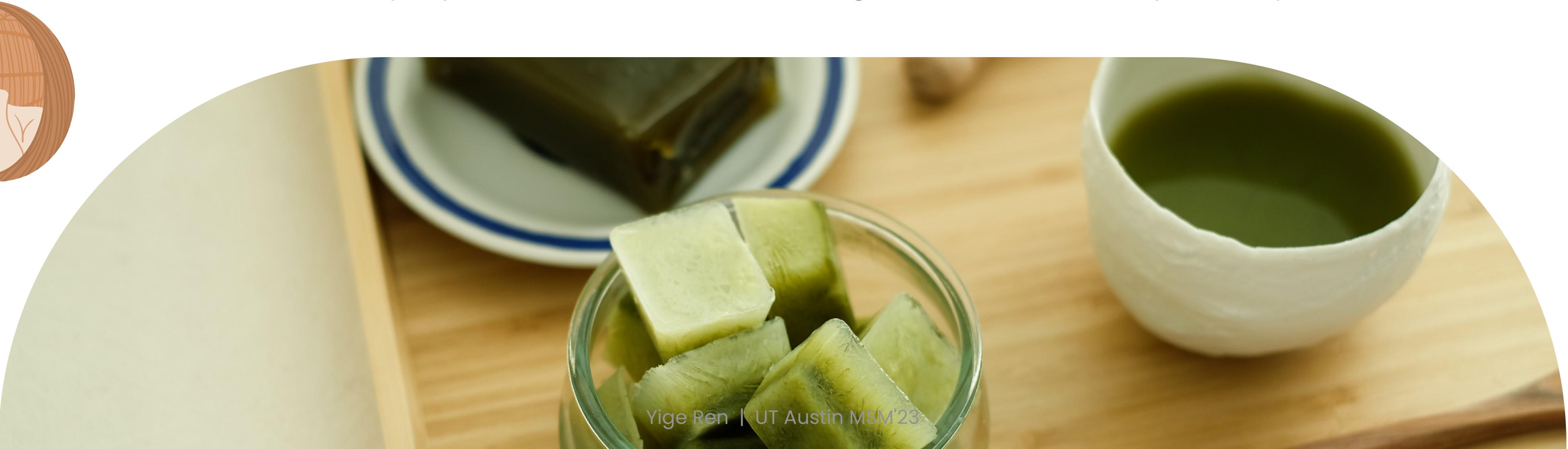


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Marketing Analytics I
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Background

Goodbelly is a line of probiotic juice products produced by Colorado-based Next Foods, Inc. The product was launched in January of 2008 and is available nationwide at retailers such as Whole Foods Market and Safeway, Inc. In May-July of 2010, the firm spent money on in-store product demonstrations in select Whole Foods regions. Goodbelly is trying to understand what, if any, impact the in-store demonstrations might have had on sales and profitability.



To help address these questions we have data from the Rocky Mountain (RM) and Northeast Regions (NE). The data include units sold, retail price, a dummy code for demo (which is a 1 if the demo occurred in a particular store within each regain in a particular week) and a dummy code for demo1-3 which is a 1 if a store had a demo 1, 2 or 3 weeks ago.

RM Data

Date	Region	Store	Units Sold	Average Retail Price	Demo	Demo1-3
5/4/10	RM	Academy	270.7489	4.29	0	0
5/11/10	RM	Academy	314.5058244	4.29	1	0
5/18/10	RM	Academy	390.6069792	4.085833333	0	1
5/25/10	RM	Academy	249.8623798	4.085833333	0	1
6/1/10	RM	Academy	222.0338943	4.793125	0	1
6/8/10	RM	Academy	276.3581971	4.147142857	0	0
6/15/10	RM	Academy	294.8631814	4.147142857	0	0
6/22/10	RM	Academy	383.4558071	4.05	1	0
6/29/10	RM	Academy	300.2942446	4.05	0	1
7/6/10	RM	Academy	296.7431221	4.581333333	0	1
7/13/10	RM	Academy	429.7977657	3.556923077	0	1
5/4/10	RM	Belmar	297.217085	4.29	0	0
5/11/10	RM	Belmar	268.4055667	4.29	0	0
5/18/10	RM	Belmar	206.0279885	4.085833333	0	0
5/25/10	RM	Belmar	201.9673415	4.085833333	0	0
6/1/10	RM	Belmar	239.7269746	3.84	0	0
6/8/10	RM	Belmar	171.3928186	4.259230769	0	0
6/15/10	RM	Belmar	172.7455945	4.99	0	0
6/22/10	RM	Belmar	379.2041274	3.768571429	1	0
6/29/10	RM	Belmar	346.1493803	4.7025	0	1
7/6/10	RM	Belmar	371.4853015	3.587857143	0	1
7/13/10	RM	Belmar	302.6070852	3.845	0	1
5/4/10	RM	Ios (aka San	145.7833608	5.39	0	0
5/11/10	RM	Ios (aka San	309.0527625	5.018571429	0	0
5/18/10	RM	Ios (aka San	154.5978808	5.215	0	0
5/25/10	RM	Ios (aka San	247.7256456	4.881666667	0	0

NE Data

Date	Region	Store	Units Sold	Average Retail Price	Demo	Demo1-3
5/4/10	NE	Bowery	127.978547	4.632857143	0	0
5/11/10	NE	Bowery	152.53466	4.9275	0	0
5/18/10	NE	Bowery	250.596457	4.36875	0	0
5/25/10	NE	Bowery	230.187753	4.208571429	0	0
6/1/10	NE	Bowery	258.266482	4.208571429	0	0
6/8/10	NE	Bowery	120.971747	4.632857143	0	0
6/15/10	NE	Bowery	323.955243	4.645555556	1	0
6/22/10	NE	Bowery	332.539583	4.12	0	1
6/29/10	NE	Bowery	318.754802	4.12	0	1
7/6/10	NE	Bowery	333.848052	3.311111111	0	1
7/13/10	NE	Bowery	335.281315	3.147	0	0
5/4/10	NE	Chelsea	169.601608	4.24	0	0
5/11/10	NE	Chelsea	209.397149	4.228333333	0	0
5/18/10	NE	Chelsea	196.349604	3.995	0	0
5/25/10	NE	Chelsea	358.380552	3.995	0	0
6/1/10	NE	Chelsea	198.009539	3.995	0	0
6/8/10	NE	Chelsea	166.4078	4.24	0	0
6/15/10	NE	Chelsea	299.873209	4.24	1	0
6/22/10	NE	Chelsea	344.8557	4.24	0	1
6/29/10	NE	Chelsea	340.266963	4.24	0	1
7/6/10	NE	Chelsea	262.281177	3.745	0	1
7/13/10	NE	Chelsea	235.868486	3.745	0	0
5/4/10	NE	Iumbus Circ	203.797549	4.204285714	0	0
5/11/10	NE	Iumbus Circ	219.2915	4.823333333	0	0
5/18/10	NE	Iumbus Circ	294.082434	4.12	0	0
5/25/10	NE	Iumbus Circ	337.729749	3.924285714	0	0

Market Response Modeling

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	592.32 6	81.564	7.262	<0.000 1	430.617	754.036
Average Retail Price	-76.987	18.127	-4.24 7	<0.000 1	-112.925	-41.049
Demo	130.66 1	27.238	4.797	<0.000 1	76.659	184.663
Demo1-3	89.445	20.270	4.413	<0.000 1	49.258	129.632

RM Model

Units Sold = 592.3263 - 76.9871 * Average Retail Price + 130.6611 * Demo + 89.44480 * Demo1-3



- According to the model, the coefficient of price is -76.987, showing the marginal effect of retail price on sales is that when the price goes up by \$1, sales will decrease by 76.987 units.
- After calculation, the average sales are 302.39 in the dataset, and the average price is 4.4, using it to calculate the **Elasticity is -1.1212**, which shows that **when the price goes up by 1%, sales will decrease by 1.12%**.
- For the coefficients of demo variables, having a demo in the store in the corresponding week will lift sales by 130.66 units; while having a demo in the store 1-3 weeks ago will lift sales by 89.45 units.

Market Response Modeling

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	388.05 6	45.194	8.586	<0.000 1	298.454	477.659
Average Retail Price	-36.195	10.672	-3.39 2	0.001	-57.353	-15.037
Demo	107.78 1	23.535	4.580	<0.000 1	61.120	154.442
Demo1-3	63.789	14.241	4.479	<0.000 1	35.555	92.023

NE Data

Units Sold = 388.0562 - 36.195 * Average Retail Price + 107.7812 * Demo + 63.789 * Demo1-3



- According to the model, the coefficient of price is -36.195, showing the marginal effect of retail price on sales is that when the price goes up by \$1, sales will decrease by 36.195 units.
- After calculation, the average sales are 254.37 in the dataset, and the average price is 4.16, using it to calculate the **Elasticity is -0.592**, which shows that **when the price goes up by 1%, sales will decrease by 0.59%**.
- For the coefficients of demo variables, having a demo in the store in the corresponding week will lift sales by 107.781 units; while having a demo in the store 1-3 weeks ago will lift sales by 63.789 units.

Testing whether the coefficients are statistically different across regions...

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	472.238	45.593	10.358	<0.0001	382.372	562.104
Average Retail Price	-57.311	10.715	-5.349	<0.0001	-78.430	-36.192
Demo	125.997	18.611	6.770	<0.0001	89.313	162.680
Demo1-3	79.263	12.914	6.138	<0.0001	53.808	104.718
Region RM	37.545	11.706	3.207	0.002	14.472	60.618

Add a Region dummy variable to see whether they have only different intercepts:

R²

0.393

Adjusted R²

0.382

2
Add another Region*Price intersectional variable to see whether they have different intercepts & price coefficients:

R²

0.405

Adjusted R²

0.391

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	376.744	64.890	5.806	<0.0001	248.839	504.650
Average Retail Price	-34.365	15.427	-2.228	0.027	-64.773	-3.957
Demo	124.586	18.486	6.739	<0.0001	88.148	161.025
Demo1-3	79.891	12.822	6.231	<0.0001	54.616	105.165
Region RM	223.526	91.313	2.448	0.015	43.538	403.513
RM*Price	-43.496	21.182	-2.053	0.041	-85.248	-1.744

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	478.703	45.906	10.428	<0.0001	388.215	569.190
Average Retail Price	-57.793	10.733	-5.385	<0.0001	-78.949	-36.637
Demo	105.183	34.478	3.051	0.003	37.221	173.146
Demo1-3	60.011	20.783	2.887	0.004	19.043	100.978
Region RM	28.263	13.699	2.063	0.040	1.259	55.266
RM*Demo	28.224	40.914	0.690	0.491	-52.424	108.872
RM*Demo1-3	30.730	26.473	1.161	0.247	-21.452	82.913

Add Region*Demo intersectional variables to see whether they have different intercepts & demo coefficients:

R^2

0.398

Adjusted R^2

0.381

3

Add Region*Price, and Region*Demo intersectional variables altogether:

R^2

0.408

Adjusted R^2

0.388

4

Source	Value	Standard error	t	Pr > t	Lower bound (95%)	Upper bound (95%)
Intercept	388.056	65.853	5.893	<0.0001	258.245	517.867
Average Retail Price	-36.195	15.550	-2.328	0.021	-66.847	-5.542
Demo	107.781	34.293	3.143	0.002	40.182	175.381
Demo1-3	63.789	20.750	3.074	0.002	22.886	104.692
Region RM	204.270	93.208	2.192	0.030	20.538	388.003
RM*Price	-40.792	21.370	-1.909	0.058	-82.918	1.334
RM*Demo	22.880	40.759	0.561	0.575	-57.464	103.224
RM*Demo1-3	25.656	26.444	0.970	0.333	-26.471	77.783



Insights

- According to the four models, the second one which adds the intercept and price coefficient has the highest adjusted R square. I will use this in the following analysis.
- This actually aligns with the model coefficients of the model(4), in which the intercepts are different across regions on the 95% significance level, and the price coefficients are statistically different across regions at the 90% level, while demo & demo1-3 coefficients are not statistically different across regions. Dropping them can get the second model.

Predict sales for running demos

Assuming the retail price in each store will remain at July 13, 2010, the weekly prices (the latest record in the dataset) for the week of July 20, and any subsequent weeks of interest, I will use the model to test for the effect of running demos. I will also include any dynamic effects of the demonstrations estimated to be present in the data.

Since there's demo 1-3 (whether the store had a demo 1, 2 or 3 weeks ago), I will look at the following 4 weeks.

Date	Store	Units Sold/Predicted Sales	Average Retail Price	Demo	Demo1-3	Region RM	RM*Price	Profits at Retailers	Goodbelly Profits
5/4/10	Academy	270.7489	4.29	0	0	1	4.29		
5/11/10	Academy	314.5058244	4.29	1	0	1	4.29		
5/18/10	Academy	390.6069792	4.085833333	0	1	1	4.085833333		
5/25/10	Academy	249.8623798	4.085833333	0	1	1	4.085833333		
6/1/10	Academy	222.0338943	4.793125	0	1	1	4.793125		
6/8/10	Academy	276.3581971	4.147142857	0	0	1	4.14714286		
6/15/10	Academy	294.8631814	4.147142857	0	0	1	4.14714286		
6/22/10	Academy	383.4558071	4.05	1	0	1	4.05		
6/29/10	Academy	300.2942446	4.05	0	1	1	4.05		
7/6/10	Academy	296.7431221	4.581333333	0	1	1	4.581333333		
7/13/10	Academy	429.7977657	3.556923077	0	1	1	3.55692308		
7/20/10	Academy	447.912	3.556923077	1	0	1	3.55692308	1593.188431	557.615951
7/27/10	Academy	403.217	3.556923077	0	1	1	3.55692308	1434.21055	501.9736924
8/4/10	Academy	403.217	3.556923077	0	1	1	3.55692308	1434.21055	501.9736924
8/11/10	Academy	403.217	3.556923077	0	1	1	3.55692308	1434.21055	501.9736924

Predicted
from
model(4)

assume same
as 7/13/10

run a demo
in 7/20/10

sales * price

assume retail
30% margin
manufacturer
50% margins

Take a store in RM
as example

How important are dynamic effects?

If taking the dynamic demo effects out, what will the aggregate profit estimates in be?

I will use the model(2) which includes Region & Price without demo effects to predict sales & profits.

Date	Store	Units Sold/Predicted Sales	Average Retail Price	Demo	Region RM	RM*Price	Profits at Retailers	Goodbelly Profits
5/4/10	Academy	270.7489	4.29	0	1	4.29		
5/11/10	Academy	314.5058244	4.29	1	1	4.29		
5/18/10	Academy	390.6069792	4.085833333	0	1	4.085833333		
5/25/10	Academy	249.8623798	4.085833333	0	1	4.085833333		
6/1/10	Academy	222.0338943	4.793125	0	1	4.793125		
6/8/10	Academy	276.3581971	4.147142857	0	1	4.14714286		
6/15/10	Academy	294.8631814	4.147142857	0	1	4.14714286		
6/22/10	Academy	383.4558071	4.05	1	1	4.05		
6/29/10	Academy	300.2942446	4.05	0	1	4.05		
7/6/10	Academy	296.7431221	4.581333333	0	1	4.581333333		
7/13/10	Academy	429.7977657	3.556923077	0	1	3.55692308		
7/20/10	Academy	473.069	3.556923077	1	1	3.55692308	1682.668795	588.9340784
7/27/10	Academy	354.992	3.556923077	0	1	3.55692308	1262.677757	441.9372151
8/4/10	Academy	354.992	3.556923077	0	1	3.55692308	1262.677757	441.9372151
8/11/10	Academy	354.992	3.556923077	0	1	3.55692308	1262.677757	441.9372151

Predicted from
model(2)

run a demo in
7/20/10

Take the store in RM
as example

sales * price

assume retail
30% margin
manufacturer
50% margins

Aggregate Profits Including Dynamic Effects	39175.7691
Aggregate Profits without Dynamic Effects	34624.7316
Profits Changes	-4551.0375
% Change	-11.62%

Dynamic effects

Calculated the sales for all the stores in both regions as the example did and compared the results; it can be seen that without the dynamic effects, the aggregate profits will be lower by around 12%.





Thank you

Welcome to contact
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