Quantifying the Differences in Management Goals and Technology Choice in Peanut Production

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Abstract

Precision farming and whole-field farming are compared with respect to yields, net present value of returns above nitrogen and water costs (NPVR), and nitrogen application rates to determine the differences in management practices. Precision farming yields, NPVR, and nitrogen application levels are then compared under yield maximizing verses profit maximizing strategies. The results quantify the gains from technology and management goals of peanut producers and suggest the technology effect is greater than the management effect.

Keywords: Peanut production, precision Farming, profit maximizing, technology adoption

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Introduction

Agriculture has been facing many challenges such as increasing input costs, shortage of irrigation water, and environmental concerns (Yu et al., 2000). Producers compete in a perfectly competitive marketplace where they are price takers, receiving only $0.19 on the dollar on average for food purchased in a supermarket (ERS). However, in the United States, consumers spend only 10.9% of their income on food, which is significantly less than other countries around the world (House Agriculture Committee). As an increasing number of small producers are unable to compete with the larger corporate farms, it becomes apparent that experience may not be able to compete with agronomic and economic recommendations in protecting margins that make the difference between profitable production and shutting down. Precision farming technology could be the key to more profitable margins.

Precision farming technology involves the sampling, mapping, analysis, and management of specific areas within fields in recognition of spatial and temporal variability with respect to soil fertility, pest populations, and crop characteristics (Weiss, 1996). Precision farming optimizes input application based on specific locations within the field. The field is divided into subunits which are optimized as opposed to optimizing the field as one unit. Traditional whole-field farming by contrast, is where optimal input levels are based on average field characteristics, or what is best for the field as a whole.

Precision farming is also known as site-specific farming, precision agriculture, prescription farming, spatially variable farming, etc. (Atherton et. al, 1999). Precision farming includes many technologies ranging from yield monitors to on-the-go variable rate application of inputs. Precision farming utilizes the help of a system of satellites to collect site-specific information called the Global Positioning System (GPS). This system was developed by the

United States Department of Defense which uses triangulation to calculate the latitude and longitude of locations on the ground. By attaching the GPS to farm equipment, specific information can be collected and analyzed for each location within the field (Watson, 2003).

Most of the adoption of precision farming is done in stages. This means that the cost of implementing this technology could vary from producer to producer. Often an alternative to investing in new technology is hiring custom applicators. The focus of this study will therefore be to assess the efficiencies gained from precision farming as opposed to the traditional whole-field farming approach. The gain in efficiency can then be used as a baseline for the amount of money justifiable to implement the new technology.

The crop chosen for this study was peanuts. Texas is the second largest peanut producing state in the U.S. with over 70% of production in the Southern High Plains of Texas (SHPT). Average production is 2850 lbs/acre, with statewide production of 855,000,000 lbs. Approximately $560 million are generated through peanut production (Texas Agricultural Statistics Service). Peanuts are unique in that they provide rotational contributions to other crops (Smith and Anisco, 2002).

Data

The data was collected in the SHPT at the Western Peanut Growers Research Farm in Gaines County, Texas. GPS readings were taken every one-half acre for a total of 84 locations within the field. The peanuts were in a 3-year rotation with cotton to minimize soil diseases with one hybrid variety, Flavor Runner 458, used in the experiment. Three nitrogen application levels were applied uniformly through the irrigation system at a rate of 70 lbs/acre across the 40-acre field. Altitude and various soil nutrients were measure in parts per million from 0 to 6 and 6 to

12 inches of the soil depth profile. Sand, silt, and clay content were also measured as a percentage of the soil, summing to 100%. Water was applied at four different rates (6.6, 9.9, 13.2, and 16.5 acre-inches) and administered through the Low Energy Precision Application (LEPA), wobblers, bubblers, or sprayers. A four-row peanut combine was used in conjunction with a Peanut Yield Mapping System (PYMS) to collect the data.

Methods

After the data was gathered for each of the locations in the field, a production function was estimated and used in conjunction with optimization models for maximizing yield and maximizing NPVR under both precision and whole-field farming scenarios. A production function was estimated from the peanut data with yield as the dependent variable, defined as Y. Independent variables included in the model were: total nitrogen from 0 to 12 inches of the soil depth profile, defined as NT, which is composed of two parts, nitrogen applied during the season and the residual nitrogen in the soil at the beginning of the season from 0 to 12 inches of the soil depth profile; pH from 0 to 6 inches of the soil depth profile, defined as PH; a dummy variable for the LEPA system, where 1 indicates use of the LEPA system and 0 indicates a wobbler, spray, or bubbler, defined as LEPA; sodium from 0 to 12 inches of the soil depth profile, defined as SOD; water measured in acre-inches, defined as W; altitude above sea level, defined as ALT; silt percentage of the soil depth profile from 0 to 6 inches, defined as SILT; manganese from 0 to 6 inches of the soil depth profile, defined as MN, and the percentage of potassium in the soil, defined as K. The estimated production function is shown in equation (1) with t-values listed in parenthesis below the parameter values:

(1) $Y = -5882.97 - 0.223*NT*NT + 5.908*NT*PH + 429.86*LEPA + 20.024*SOD$

(-2.36) (-2.27) (1.92) (2.26) (3.01)

+ 0.093*W*ALT + 84.347*SILT + 126.299*MN +196.720*K

(1.96) (1.68) (2.21) (3.20) $R^2 = .305$

The production function included several interaction terms that model the biological nature of the field. SOD and K were significant at the 99% certainty level; the intercept, NT*NT, NT*PH, LEPA, W*ALT, and MN were significant at the 95% certainty level, and SILT was significant at the 91% certainty level. Overall, the model explained 30.5% of the variation in peanut yield. To determine the NPVR maximizing level of nitrogen application, the marginal physical product of nitrogen was set equal to the price of nitrogen divided by the price of peanuts. To determine the yield maximizing level of nitrogen application, the change in peanut yield with respect to change in total nitrogen available for plant uptake was set equal to zero. Using the nitrogen application levels recommended, yield and NPVR above nitrogen and water costs can be determined.

(2) $MaxNPVR = ((PC * Y(NT)) - (PN * NA))$

subject to:

(3) $NT = NA + NR$,

(4) and $NA, NR, NT \geq 0$

(5) $MaxYield = Y(NT)$

subject to:

(6) $NT = NA + NR$,

(7) and $NA, NR, NT \geq 0$

Where, NPVR was the returns to land, irrigation water, overhead, risk, and management from production above nitrogen and water costs; PC was the price of peanuts; Y was the peanut yield function; NT was the total amount of input available for crop growth; PN was the price of the input; NA was the amount of input applied; and NR was the residual amount of input already available in the soil.

Equations (2) and (5) were the objective functions, or performance measure of the optimization model. Equations (3) and (6) were the equality constraints that sums the amount of input applied and residual input to obtain the total amount of input available for peanut growth. These equations were used in the objective functions to calculate peanut yield. Non-negativity constraints were also specified for input application, residual, and total amount of input (equations (4) and (7)).

This study analyzed the efficiencies gained from improved technology. This was done by optimizing nitrogen application under precision farming management practices and whole-field farming management practices. This allowed for quantification of the changes in optimal nitrogen, yield, and NPVR under different technologies. The study also allowed for quantifying the management effect. Under precision farming management, yield, nitrogen application, and NPVR can be compared under the goal of yield maximization and NPVR maximization.

Typically agronomic recommendations only consider yield maximization as a goal. Because yield maximization is not necessarily consistent with profit maximization, errors in application recommendations may be compounded under precision agriculture practices where decisions are made on smaller subunits of the field. Therefore, this paper attempts to determine the efficiencies gained from adopting technology and management goals by addressing differences in precision farming and whole-field farming with respect to yields, net present value of returns above nitrogen and water costs (NPVR), and nitrogen application levels under both a yield and profit maximizing management goal.

Results

Several price scenarios were used to analyze the researchable problem. Input and output prices were varied, however, the results were not particularly sensitive to the prices. Therefore, a representative price scenario where the price of peanuts were $0.206/lb., nitrogen costs were $0.25/lb. and water costs were $2.68/acre-inch was used to illustrate these effects. Table 1 compares precision farming to whole-field farming with respect to yield, NPVR, and nitrogen application changes. To determine the optimal yield at each location, the optimal nitrogen application was determined and then placed into the forecasted yield equation. Under the precision farming scenario, nitrogen application was optimized for each location with the characteristics of each location in the field. Under the whole-field farming scenario, nitrogen application was optimized under average location characteristics and then the optimal nitrogen application was plugged back into the estimated yield equation for each location in the field.

Precision Farming vs. Whole-Field Farming under Yield Maximization

At every location in the field, yield was estimated to be higher, ranging from 0.00% in locations #26, #52, #55, #58, #66, and #72 to as much as 38.6% more yield in location #10, when managing for yield under precision farming practices as opposed to whole-field farming practices. The average yield for precision farming was 2846.28 lbs/acre and 2789.64 lbs/acre under whole-field farming, with an average increase in yield of 2.34% across all locations. The

NPVR generated under the management goal of maximizing yield was analyzed under both management practices, where the average NPVR under precision farming was $544.01/acre above nitrogen and water costs and $532.34 when whole-field farming practices were used. NPVR increased by as much as 48.82% in location #10 and decreased by as much as -0.07% in location #6 when precision farming was used. This indicates that maximizing yield can actually decrease NPVR at particular locations. The nitrogen application changed as well depending on which management practice was used and whether the goal was to maximize NPVR or yield. On the average, there was no difference in nitrogen application when maximizing yield or NPVR under the two management practices, but ranged from an increase of 40.89% in location #25 to a decrease of 83.57% in location #10 when using precision farming practices as compared to whole-field farming practices under a yield maximizing scenario.

Precision Farming vs. Whole-Field Farming under NPVR Maximization

Yields were also analyzed under both precision and whole-field farming scenarios when maximizing NPVR was the goal. When maximizing NPVR yield was as much as 33.33% higher in location #10 when precision farming was used to as little as .06% less in locations #28 and #69 (Table 1). This indicates that maximizing NPVR in each location can be accomplished by increasing yield in some locations and decreasing yield in other locations, depending on the biological features of the location. The average yield under precision farming was 2844.63 lb/acre and 2787.98 lbs/acre under whole-field farming for an average increases in yield of 2.32% when maximizing NPVR using precision farming practices as opposed to whole-field farming practices, with an average change in yield of 2.57%. Yield was maximized most when precision farming technology was used under a yield maximizing scenario, followed by precision farming under a NPVR maximizing scenario, whole-field under a yield maximizing scenario, and finally whole-field farming under a NPVR maximizing scenario.

As suspected, the ideal scenario would be to manage each location precisely to maximize NPVR. At every location, NPVR increased when using precision farming practices with the goal of maximizing NPVR. The average NPVR for precision farming was $544.35/acre and $532.68/acre under whole-field farming practices. The change in NPVR ranged from 0.00% in locations #26, #55, #58, #66, and #72 to 42.27% in location #10, with an average increase of 2.54% when using precision farming technology as opposed to whole-field farming under the goal of maximizing NPVR. NPVR was maximized most when precision farming technology was used under a NPVR maximizing scenario, followed by precision farming under a yield maximizing scenario, whole-field under a NPVR maximizing scenario, and finally whole-field farming under a yield maximizing scenario.

Nitrogen application increased by as much as 42.73% over whole-field nitrogen application in location #25 and decreased by as much as 87.33% in location #10 when precision farming practices were used (as opposed to whole-field farming) under the goal of NPVR maximization. This shows that nitrogen could be more efficiently used when site-specifically managed. When an optimal uniform application is used, nitrogen is either over or under applied at every location in the field, resulting in lost NPVR. The average nitrogen application for whole-field farming was 60.45 lbs/acre under the NPVR maximizing goal and 63.18 lbs/acre under the yield maximizing goal. Table 1 shows the over and under application by comparing optimal nitrogen application levels for precision and whole-field farming under both yield and NPVR maximizing goals.

Yield vs. NPVR Maximization in Precision Farming

Table 2 shows the differences in yield, NPVR, and nitrogen application by comparing the goal of yield maximization verses NPVR maximization under precision farming technology only. When maximizing NPVR, the yield was smaller at every location than when maximizing yield, with an average decrease in yield of 0.06% ranging from 0.05% to 0.09% less yield. The average NPVR above nitrogen and water costs was 0.06% more NPVR when maximizing NPVR as compared to the NPVR when maximizing yield in precision farming. Increases in NPVR when maximizing NPVR as compared to maximizing yields ranged from 0.05% to 0.10%. This tells us that most of the gains are from technology (precision farming over whole-field farming) rather than the management goal (maximizing NPVR over maximizing yield). However, the most efficiency was gained under precision farming with the goal of NPVR maximization.

Table 2 also shows the differences in nitrogen application when maximizing NPVR versus maximizing yield. When maximizing NPVR under precision farming as compared to maximizing yield under precision farming, less nitrogen was used in all locations. The decrease in nitrogen application ranged from 3.06% to 26.22%, with an average of 4.98% less nitrogen used when maximizing NPVR over maximizing yield. This tells us that in this field, nitrogen is over applied, i.e., the additional cost of the additional nitrogen applied to maximize yield is not justified by the additional revenue from the additional yield. Producers would be financially better off by using less nitrogen, producing less yield, and simultaneously increasing NPVR.

Conclusion

In summary, yield increased by 2.34% on the average when using precision farming over whole-field farming under the yield maximizing scenario. Yields increased by 2.32% on the average when precision farming was used over whole-field farming when using the NPVR maximizing scenario. Yields increased by 0.06% when maximizing yield as opposed to maximizing NPVR under the precision farming scenario. Therefore, the greatest increases in yield were due to technology, not management goal. NPVR increased on the average when using precision farming technology as opposed to whole-field farming technology by 2.57% when maximizing yield, and by 2.54% when maximizing NPVR. NPVR increased by 0.06% on the average under precision farming practices when maximizing NPVR as opposed to maximizing yield. Again, we learn that the largest increases in NPVR are from changing technology, not from management goals.

Finally, nitrogen applications did not change on the average when comparing technologies, but decreased by 4.98% when maximizing NPVR instead of maximizing yields under precision farming management practices. Thus, from an environmental standpoint, changing technologies does not change input application on the average, but does minimize the under or over application per location within the field. However, less nitrogen application is used on the average when managing under the goal of maximizing NPVR rather than maximizing yields under precision farming management practices.

In conclusion, precision farming will increase NPVR on the average regardless of whether the producer is maximizing yield or NPVR by approximately 2.5%. This translates to $11.67 more per acre when using precision farming practices, which is the amount justifiable in implementing precision farming practices. Therefore, $11.67/acre must cover soil sampling, analysis, and variable rate application.

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Table 1. Comparison of technological effect (precision farming and whole-field farming) with respect to yield, NPVR, and nitrogen application under different management goals.

Location	Y% Yield Max	Y% NPVR Max	NPVR% Yield Max	NPVR% NPVR Max	NA% Yield Max	NA% NPVR Max
1	3.14%	4.12%	2.41%	3.47%	28.78%	30.07%
2	0.54%	0.11%	1.09%	0.61%	-10.83%	-11.32%
3	4.46%	3.31%	6.09%	4.81%	-34.54%	-36.09%
4	2.84%	1.94%	4.07%	3.07%	-27.69%	-28.94%
5	1.08%	1.63%	0.59%	1.19%	17.18%	17.96%
6	0.08%	0.22%	-0.07%	0.08%	4.56%	4.77%
7	0.04%	0.13%	-0.06%	0.04%	3.45%	3.61%
8	1.04%	1.50%	0.63%	1.12%	19.80%	20.69%
9	4.60%	5.71%	3.83%	5.02%	37.72%	39.42%
10	38.60%	33.33%	48.82%	42.27%	-83.57%	-87.33%
11	0.66%	1.11%	0.24%	0.73%	12.95%	13.53%
12	12.43%	10.46%	15.47%	13.25%	-59.78%	-62.48%
13	0.01%	0.06%	-0.04%	0.01%	1.95%	2.04%
14	0.12%	-0.03%	0.28%	0.13%	-7.00%	-7.31%
15	0.03%	-0.05%	0.11%	0.03%	-3.32%	-3.46%
16	5.24%	4.15%	6.74%	5.54%	-42.89%	-44.82%
17	1.31%	1.88%	0.82%	1.42%	20.39%	21.31%
18	1.64%	2.29%	1.10%	1.79%	22.45%	23.46%
19	1.75%	2.35%	1.24%	1.88%	25.65%	26.81%
20	1.08%	1.63%	0.59%	1.19%	17.18%	17.96%
21	2.51%	3.31%	1.87%	2.73%	27.71%	28.96%
22	4.68%	5.93%	3.86%	5.21%	34.52%	36.07%
23	4.67%	6.09%	3.79%	5.37%	30.32%	31.69%
24	1.50%	2.06%	1.01%	1.61%	23.55%	24.61%
25	7.16%	8.81%	6.27%	8.07%	40.89%	42.73%
26	0.00%	-0.01%	0.01%	0.00%	-0.23%	-0.24%
27	0.66%	1.07%	0.28%	0.72%	14.06%	14.69%
28	0.04%	-0.06%	0.14%	0.04%	-3.43%	-3.59%
29	0.02%	-0.05%	0.08%	0.02%	-2.29%	-2.39%
30	0.03%	0.11%	-0.06%	0.03%	2.98%	3.11%
31	5.53%	4.30%	7.28%	5.92%	-40.31%	-42.13%
32	0.01%	0.04%	-0.03%	0.01%	1.39%	1.46%
33	18.80%	16.37%	22.54%	19.82%	-77.16%	-80.63%
34	1.03%	0.55%	1.61%	1.10%	-18.63%	-19.47%
35	0.57%	0.94%	0.22%	0.62%	13.54%	14.15%
36	0.02%	-0.05%	0.09%	0.02%	-2.29%	-2.39%
37	0.02%	0.09%	-0.05%	0.02%	2.50%	2.61%
38	0.69%	1.08%	0.33%	0.74%	15.60%	16.30%
39	1.72%	2.41%	1.14%	1.89%	21.93%	22.92%
40	4.22%	5.45%	3.40%	4.74%	31.39%	32.80%
41	0.73%	1.13%	0.37%	0.79%	16.19%	16.92%
42	0.19%	0.39%	-0.01%	0.20%	8.24%	8.61%
43	1.49%	0.91%	2.22%	1.59%	-22.27%	-23.27%
44	0.09%	0.23%	-0.05%	0.10%	5.63%	5.88%
45	2.00%	1.30%	2.90%	2.14%	-24.96%	-26.08%
46	0.20%	0.42%	-0.01%	0.22%	8.24%	8.61%
47	0.79%	1.25%	0.37%	0.86%	15.09%	15.77%
48	0.17%	0.37%	-0.02%	0.19%	7.73%	8.07%
49	6.13%	4.97%	7.71%	6.45%	-47.68%	-49.82%
50	0.08%	-0.05%	0.22%	0.08%	-5.37%	-5.62%

Table 1 Continued. Comparison of technological effect (precision farming and whole-field farming) with respect to yield, NPVR, and nitrogen application under different management goals.

Location	Y% Yield Max	Y% NPVR Max	NPVR% Yield Max	NPVR% NPVR Max	NA% Yield Max	NA% NPVR Max
51	0.82%	1.28%	0.40%	0.90%	15.64%	16.34%
52	0.00%	-0.03%	0.04%	0.01%	-1.22%	-1.27%
53	0.55%	0.90%	0.23%	0.59%	14.06%	14.69%
54	1.09%	1.65%	0.60%	1.20%	17.22%	18.00%
55	0.00%	0.03%	-0.02%	0.00%	0.88%	0.92%
56	1.06%	1.59%	0.59%	1.16%	17.74%	18.54%
57	0.04%	-0.05%	0.14%	0.04%	-3.83%	-4.00%
58	0.00%	0.00%	0.00%	0.00%	-0.11%	-0.12%
59	2.13%	2.82%	1.56%	2.29%	27.23%	28.46%
60	2.63%	3.58%	1.91%	2.94%	25.06%	26.19%
61	0.12%	-0.04%	0.31%	0.13%	-6.52%	-6.81%
62	0.70%	0.31%	1.16%	0.74%	-15.50%	-16.20%
63	10.16%	8.48%	12.67%	10.79%	-56.14%	-58.67%
64	0.07%	-0.05%	0.21%	0.08%	-4.94%	-5.16%
65	1.02%	1.55%	0.53%	1.12%	16.63%	17.38%
66	0.00%	0.01%	-0.01%	0.00%	0.40%	0.42%
67	0.23%	0.00%	0.50%	0.25%	-8.58%	-8.96%
68	0.12%	0.29%	-0.05%	0.13%	6.14%	6.42%
69	0.03%	-0.06%	0.12%	0.03%	-2.80%	-2.93%
70	0.51%	0.19%	0.88%	0.54%	-13.88%	-14.51%
71	1.07%	0.61%	1.62%	1.13%	-20.17%	-21.08%
72	0.00%	0.01%	-0.01%	0.00%	0.36%	0.38%
73	2.13%	1.45%	3.02%	2.27%	-27.02%	-28.24%
Average	**2.34%**	**2.32%**	**2.57%**	**2.54%**	**0.00%**	**0.00%**

Table 2. Comparison of Precision Farming with respect to yield, NPVR, and nitrogen application under different management goals.

Location	PF-Y% Y vs. P Max	PF-P% Y vs. P Max	PF-NA% Y vs. P Max
1	-0.07%	0.08%	-3.35%
2	-0.09%	0.10%	-4.83%
3	-0.07%	0.07%	-6.58%
4	-0.07%	0.07%	-5.96%
5	-0.07%	0.07%	-3.68%
6	-0.07%	0.07%	-4.12%
7	-0.06%	0.06%	-4.16%
8	-0.05%	0.05%	-3.60%
9	-0.06%	0.06%	-3.13%
10	-0.07%	0.08%	-26.22%
11	-0.07%	0.08%	-3.81%
12	-0.06%	0.06%	-10.71%
13	-0.06%	0.06%	-4.23%
14	-0.05%	0.05%	-4.63%
15	-0.05%	0.05%	-4.46%
16	-0.05%	0.05%	-7.54%
17	-0.06%	0.06%	-3.58%
18	-0.06%	0.06%	-3.52%
19	-0.05%	0.05%	-3.43%
20	-0.07%	0.07%	-3.68%
21	-0.06%	0.06%	-3.37%
22	-0.07%	0.08%	-3.20%
23	-0.09%	0.10%	-3.31%
24	-0.05%	0.05%	-3.49%
25	-0.07%	0.08%	-3.06%
26	-0.05%	0.06%	-4.32%
27	-0.06%	0.07%	-3.78%
28	-0.06%	0.06%	-4.46%
29	-0.06%	0.06%	-4.41%
30	-0.06%	0.06%	-4.18%
31	-0.06%	0.06%	-7.22%
32	-0.06%	0.06%	-4.25%
33	-0.05%	0.05%	-18.86%
34	-0.05%	0.06%	-5.29%
35	-0.06%	0.06%	-3.79%
36	-0.06%	0.07%	-4.41%
37	-0.06%	0.07%	-4.20%
38	-0.05%	0.06%	-3.73%
39	-0.07%	0.07%	-3.53%
40	-0.08%	0.09%	-3.28%
41	-0.05%	0.06%	-3.71%
42	-0.05%	0.06%	-3.98%
43	-0.05%	0.06%	-5.54%
44	-0.05%	0.06%	-4.08%
45	-0.06%	0.06%	-5.74%
46	-0.06%	0.06%	-3.98%
47	-0.06%	0.07%	-3.74%
48	-0.05%	0.06%	-4.00%
49	-0.05%	0.05%	-8.23%
50	-0.05%	0.05%	-4.55%

Table 2 Continued. Comparison of Precision Farming with respect to yield, NPVR, and nitrogen application under different management goals.

Location	PF-Y%	PF-P%	PF-NA%
	Y vs. P Max	Y vs. P Max	Y vs. P Max
51	-0.06%	0.07%	-3.73%
52	-0.06%	0.06%	-4.36%
53	-0.05%	0.06%	-3.78%
54	-0.07%	0.07%	-3.68%
55	-0.06%	0.06%	-4.27%
56	-0.06%	0.07%	-3.66%
57	-0.05%	0.05%	-4.48%
58	-0.05%	0.06%	-4.31%
59	-0.05%	0.06%	-3.39%
60	-0.08%	0.08%	-3.44%
61	-0.05%	0.06%	-4.61%
62	-0.05%	0.06%	-5.10%
63	-0.05%	0.06%	-9.82%
64	-0.05%	0.06%	-4.53%
65	-0.07%	0.07%	-3.69%
66	-0.06%	0.07%	-4.29%
67	-0.06%	0.06%	-4.71%
68	-0.06%	0.06%	-4.06%
69	-0.07%	0.07%	-4.43%
70	-0.05%	0.05%	-5.00%
71	-0.05%	0.05%	-5.40%
72	-0.06%	0.06%	-4.29%
73	-0.05%	0.06%	-5.90%
Average	**-0.06%**	**0.06%**	**-4.98%**