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Are Some Analysts Superior at Forecasting World Grain Supplies?

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Are Some Analysts Superior at Forecasting World Grain Supplies?

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University of Arkansas, 2022

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Abstract

Whether agriculture is how you make your living or simply a means of putting food on your table, the prices of agricultural commodities and products affect us all. When buying and selling agricultural commodities, both farmers and firms use futures markets. Futures markets help minimize price risk, which is important to both sides of the transaction.

Recently, private analysis firms have started to forecast the information contained in the USDA's WASDE report. This is relevant because future prices react to new information contained in WASDE reports. These firms will release their information a few days before the WASDE comes out and having access to information about how prices will move can really help a firm become more profitable.

For this thesis, we analyzed if there is a particular firm that is consistently more accurate than the others. To do this, we first ranked the analysts over two-month periods by who had the least amount of surprise (the difference between the analyst's forecast and what the WASDE released). Next, we ran a Fisher exact test to test for statistically significant dependence between winning (losing) groups in the first period and winning (losing) groups in the second period. We were then able to evaluate these results based on the following hypothesis: there is no dependence between winners (losers) in month 1 and winners (losers) in month 2.

Our results showed that there is no dependence between an analyst being in the "winning" group one month and again being in the winning group the next month. This means that the chance of an analyst to consistently be able to predict the data the USDA releases is pretty slim.

Introduction

Background and Need

Agriculture is an important aspect of our day-to-day lives, even if it is not widely acknowledged. Farming and agriculture are necessities that allow a global population a means of survival and potential to thrive. Agricultural commodities are important because they not only feed humans, but they also feed livestock we consume, and can be used as fuel. Over 1.3 billion people work in agriculture, which is about 20% of the world population (Pines). Agriculture also contributes about \$3 trillion to the U.S. economy (Pines). Some examples of agricultural commodities include corn, soybeans, wheat, rice, and oats.

The U.S. agricultural marketing system relies on accurate and timely information about world supply and demand of these commodities. Once a month, the Interagency Commodity Estimates Committees (ICECs) prepare and release a report that forecasts the supply and use of many different agricultural commodities. This report is called the World Agricultural Supply and Demand Estimates (WASDE). The ICECs are chaired by USDA World Agricultural Outlook Board analysts and representatives from the Agricultural Marketing Service (AMS), Economic Research Service (ERS), Farm Service Agency (FSA), and the Foreign Agricultural Service (FAS). The WASDE report covers the supply and use of U.S. and world wheat, rice, coarse grains, oilseeds, and cotton, as well as the U.S.'s supply and use of sugar, meat, poultry, eggs, and milk. ("WASDE FAQs," n.d.)

ICECs use information from many different sources to compile these reports. The National Agricultural Statistics Service (NASS) is the primary source of information regarding U.S. crop and livestock production/stocks. However, information and data are also taken from foreign governments, satellite imagery, and weather data. Data about agricultural trade comes

from the U.S. Census Bureau and the FAS. The ERS gathers and analyzes information on domestic use, prices, and agricultural policy from many government agencies. (“WASDE FAQs,” n.d.) Between all three of these major information sources, there is a lot of data to aggregate. All the gathered information is reviewed by ICEC members that have diverse expertise and perspectives in many areas of agriculture, and the WASDE report is compiled.

The WASDE report is important to firms and individuals in the agricultural sector because it gives them critical information about the prices, supply, and demand of commodities. The prices of commodities change on a day-to-day basis, which can make it hard to decide when to buy and sell. That is why many individuals and firms look to the WASDE report. Given the importance of the WASDE in guiding marketing and risk management decisions in the agricultural supply chain, many private analyst firms release their own forecasts of the supply information contained in WASDE reports several days before it is released by the USDA. This is important because these private forecasts provide a benchmark for firms that are going to be buying or selling commodities (Milacek & Brorsen, 2017). When firms have access to information about prices, acres harvested, and predicted yield, they can shift their position in the market to have a more favorable outcome. Agricultural firms across the supply chain are willing to subscribe and pay for this private information, as they believe it helps them better manage their risks and profits. Agricultural firms are aware that market prices (futures and cash prices) tend to respond to new supply and demand information contained in WASDE reports and so having advanced warning of potential price movements – through access to the private analyst forecasts – is a useful marketing and risk management tool.

Problem Statement

A large literature (Isengildina-Massa et.al, 2021) has shown that future prices react to new information contained in WASDE reports. New information, also referred to as shocks or surprises is typically measured as the percentage difference between WASDE and the average private analyst forecasts of U.S. supply information (e.g. ending grain stocks for a given crop year). This implies that both WASDE and private analyst forecasts are deemed important by the market. Private analyst forecasts reflect market expectations prior to the release of the WASDE, while the WASDE provides additional supply and demand information and changes market expectations. However, the extant literature has only focused on the average of the private analyst forecasts. Thus, a natural question to ask is: “Are all private analyst forecasts equally useful to the market?” In addition, previous studies have focused attention on specifically U.S. commodity supply information. However, the WASDE also provides commodity supply forecasts for all major grains and oilseeds across countries. Given that private analyst firms make forecasts for both U.S. and world grain stocks, this thesis analyzes whether some private analyst firms are superior at forecasting world ending-stocks of corn. U.S. and world ending stocks are highly correlated and new information on both likely move prices.

Purpose of the Study

To answer the question of whether all private analyst forecasts are equally useful, this study analyzes the persistent or consistent forecast accuracy of individual private analyst firm forecasts for corn ending stocks over the October 2016 – December 2021 period. From a practical standpoint, determining whether certain private analyst firms provide consistently superior forecasts is of relevance to the agricultural firms that use private analyst forecasts to

make marketing and risk management decisions. Although many of the private analyst firms' forecasts are normally within a few percentage points of what the WASDE report comes out to, knowing even the slightest difference in ending stocks can have a large potential price impact and therefore be crucial to how an agricultural firm will make a decision. Choosing a less accurate private analyst firm could mean losing a good deal of money.

Research Objective (Research Question)

The following objective guided this study: To determine if some private analysts have consistently superior forecasting skills, the forecast errors of private analyst firms are documented and ranked with respect to each monthly WASDE release over the period. The Fisher exact test is used to determine if higher (lower) ranked private analysts with lower (higher) forecast errors in one period also tend to rank higher (lower) in the next period. Consistency or persistence in forecasting performance would be indicative of superior forecasting skill for some analysts and inferior forecasting skill for others.

Literature Review

Futures Markets

Futures markets have always played a large role in the world of agricultural commodities. These markets are complex and can be very confusing if one does not know much about them. When an agricultural business buys grain from a producer or grain merchandising firm, they typically hedge their cash purchase with futures contracts. The biggest advantage of using a futures hedge is minimizing price risk. Price risk analysis is crucial for a firm to ensure businesses are getting a good deal on their purchase and know that they will not be losing profit. Commodity prices are dependent on supply and demand and can vary from region to region across the country. This section will review (1) how futures markets work, and (2) a discussion of WASDE reports and private analyst firms' forecasts or world ending stocks.

The markets used to trade agricultural commodities are highly complex. They involve the farmers and ranchers, processors, distributors, packagers, wholesalers, and retailers (Agriculture Futures). Futures trading in the U.S. originated when the Chicago Board of Trade (CBOT) was created in the mid-19th century (Mintert and Welch, 2021). Buyers and sellers of commodities both aim to eliminate the risk associated with the possibilities of prices rising or falling. This is where futures markets come in to play. Sellers want to limit the price risk associated with owning inventories of grain, and buyers want to establish a price for these commodities before they are to be delivered. These buyers and sellers will enter into a futures contract to achieve these goals. A futures contract is a binding agreement between a buyer and a seller to produce or deliver a specific commodity at a specific price on a specific date. Each futures contract is standardized by identifying the delivery month, the quantity and quality of the commodity, the

delivery location, and the payment terms (Mintert and Welch, 2021). According to Mintert and Welch, futures markets provide:

- Rules of conduct that traders must follow or risk expulsion
- An organized marketplace with established trading hours by which traders must abide
- Standardized trading through rigid contract specifications, which ensure that the commodity being traded in every contract is virtually identical
- A focal point for the collection and dissemination of information about the commodity's supply and demand, which helps ensure all traders have equal access to information
- A mechanism for settling disputes among traders without resorting to the costly and often slow U.S. court system
- Guaranteed settlement of contractual and financial obligations via the exchange clearinghouse

Futures contracts give buyers and sellers the opportunity to establish a price for future delivery. For example, a farmer could sell a corn futures contract in August to a grain elevator for delivery in March. A futures contract is measured by the number of units (bushels, hundredweight, etc.) in each contract times the current price (Mintert and Welch, 2021). For commodity grain, such as corn and soybeans, one contract equals 5,000 bushels. So, if the current price per bushel of corn is \$2.40, one contract would equal \$12,000. A futures contract price reflects today's opinion of what a commodity will be worth when the futures contract expires (Mintert and Welch, 2021).

According to Mintert and Welch, futures contract prices can also be used as a source of price forecasts. Historical data can be used to predict future prices for a particular grade (quality) and location of a commodity. Having a basic understanding of how futures markets operate is essential to be able to understand how price forecasting works.

WASDE Report

Once a month, the United States Department of Agriculture (USDA) releases a report called the World Agricultural Supply and Demand Estimate (WASDE). This report has been known to shift commodity prices right before and right after it is released (Milacek and Brorsen, 2017). Since this report is only released once a month, it is helpful to have an idea of what will be included. This way, a business can make decisions about buying or selling grain in advance or taking appropriate hedges in futures to mitigate price risk associated with new supply and demand information contained in the report. WASDE reports contain supply and demand information for major grain and oilseed commodities produced in most countries around the world. For each commodity, ending stocks, which is the key supply side information considered to move prices, the WASDE aggregates ending stocks across countries to estimate world ending stocks. Low (high) ending stocks reflect tight (abundant) supplies of a commodity and are associated with higher (lower) prices. As already noted a large literature (Isengildina-Massa et.al, 2021) has shown that future prices react to new information about U.S. ending stocks contained in WASDE reports. Given this, it is expected that surprises to world stocks, calculated as the percentage difference between WASDE and the average private analyst forecasts of world stocks, would also be expected to move futures prices. Positive (negative) surprises would lead to lower (higher) prices. The larger the shock the greater the price response. Importantly for this thesis, the accuracy of private analyst projections of world ending stocks are economically relevant to agricultural firms.

Methodology

Research Design

To further the understanding on which price predicting firm is the most accurate, I will be conducting a quantitative non-experimental project that is based on looking at data collected over several years.

Rigor

As a researcher, validity and reliability were two very important factors to making a successful study. Although nearly impossible to be 100% certain of the credibility, confirmability, transferability, and dependability in any research, this study of the accuracy of agricultural price forecasting firms aimed to be as valid and reliable as possible. The data used will not need to be cleaned, as it already has been by Bloomberg News Service. This study is also able to be replicated if the same formulas are used.

Data Collection

Based on procedures outlined by Dr. Andrew McKenzie, the data collected for this study came from the Bloomberg News Service. Since October 2016, every WASDE report has been accompanied by a continuous record of corresponding analysis surveys conducted and published by Bloomberg for corn world ending stocks. All of the data from October 2016 through December 2021 were recorded. This totaled to 62 reports. In January of 2019, there was no WASDE report releases because of the government shutdown. In November of 2018, China revised its inventory estimates for domestic corn, and because of this, analysts' errors were dramatically more significant than normal. Because all of the analysts were equally impacted by this event, the observation was not omitted from the analysis.

This research will compare and contrast 37 analysts to see which is the most accurate, allowing customers to decide which analyst will be the most reliable. However, not every analyst releases a report every month. In the list below, the name of the firm as well as the number of reports they released (out of 62) have been recorded.

- A/C Trading (2)
- ADM Investor (62)
- Advanced Market (59)
- AgMarket.Net (26)
- AgriSompo (3)
- AgriVisor (22)
- Allendale (60)
- Bennett Consult (12)
- Brugler (39)
- CHS Hedging (52)
- Doane (32)
- ED&F MAN (55)
- EFG Group (18)
- Farm Futures (36)
- Futures International (62)
- Grain Cycles (20)
- Hightower (6)
- Hueber Report (46)

- INTL FCStone (48)
- Lakefront (13)
- Linn Group (21)
- MaxYield Cooperative (7)
- Mckeaney-Flavell (61)
- Midwest Market Solutions (22)
- NorthStar (60)
- Pira Energy (4)
- Price Futures (1)
- Prime Ag (51)
- Risk MC (26)
- Roach AG (1)
- S&P Global Platts (3)
- Societe Generale (1)
- Stewart-Peterson (54)
- StoneX (14)
- U.S. Commodities (51)
- Western Milling (51)
- Zaner Group (60)

To begin the research process, we manually input data for world ending stocks for corn. This data came from Bloomberg News Service. All of the data that was forecasted by the firms was found in the monthly reports released by Bloomberg. To see how accurate these firms really were, we then inputted the corresponding data from the USDA's WASDE reports. From there, we were able to calculate the forecast error to see how much of a difference there was between what the firms forecasted and the USDA found. To calculate the forecast error, we simply took the natural log of the difference between the USDA's number and the analyst's number. Figure 1 displays the forecast errors as a histogram. The forecast errors are normally distributed with the exception of the major outliers associated with Chinese revision in November of 2018. From figure 1 we can see that most forecast errors range from -1.8% to 1.2%.

We converted these logs to absolute value because we wanted to see how much of a difference there was; we weren't as concerned with the direction of the movement. The size of the movement is important because when there is a larger shock to these numbers, the more the price of the commodity will move. Depending on the direction (positive or negative) of the shock, the prices of the commodity will increase or decrease.

After finding the difference between the analysts' predictions and the USDA's actual report, we then began to look at how each analyst did over a period of two consecutive months. We compiled a list of each analyst and their prediction for two consecutive months. First, we got rid of any analysts that were not reporting for both months. Then, once we had the analysts that were the same for both months, we sorted them from lowest error to highest error. We then grouped these analysts into winners (first period) and losers (first period), as well as winners (second period) and losers (second period). Winners were classified as those firms in the top half of the overall pool ranked by forecast error, with low forecast errors ranked higher than high

forecast errors. We then used a Fisher exact test to test for statistically significant dependence between winning (losing) groups in the first period and winning (losing) groups in the second period. This approach was used by Irwin, Good and Martines-Filho (2006), when comparing persistent superior performance of agricultural market advisory services across crop years. The idea behind the approach is to uncover whether some private analysts truly have superior forecasting skills over others. Simply ranking forecasting performance by firm across the whole sample period would be uninformative in answering this question. If rankings were generated randomly some analysts would appear to be superior forecasters than others, but such rankings could be attributed merely to chance. However, comparing performance in terms of persistence or consistency across observation periods provides a statistical means of uncovering true forecasting skill. If knowing which firms perform best in one month helps to statistically predict which firms will perform best in the next month, which can be detected by the Fisher exact test, then this would be indicative of persistent superior or inferior forecasting performance by some firms. The Fisher exact test is nonparametric test that is akin to a Chi-Squared test, but is more robust to outliers and small sample sizes. Both tests seek to determine if there is statistical dependence between groups or categories. For example, if a group of students smoke, is it more likely that they also drink alcohol? In our case, if an analyst is a good forecaster (top 50%) in one month, is it more likely that the same firm will also be a good forecaster the next month? The predictability tests are reported in table 1 and for comparison purposes p-values for both the Fisher exact test and the Chi-Squared test are included. Formally, our null hypothesis is: there is no dependence between winners (losers) in month 1 and winners (losers) in month 2. Therefore, if we reject the null hypothesis, this is equivalent to finding statistical evidence of dependence, persistent or predictable forecasting skill by analyst groups.

Results

We found strong evidence in favor of the null hypothesis: that there is no dependence between winning (losing) firms from one month to the next. We failed to reject the null hypothesis in all of our 62 cases using the Fisher exact test at the 5% significance level and only twice at the 10% significance level. Similarly, using the Chi-Squared test the null was only rejected in one case at the 5% significance level, and in four cases at the 10% significance level.

In addition, with respect to the two times we reject the null at the 10% level under the Fisher test, we find dependence between winners (losers) in the first paired month and losers (winners) in the second paired month. In other words, if you were a winner to begin with you are more likely to be a loser in the second month. For example, with respect to the 1/8/2018 – 2/2/2018 pairing we observe seven firms who were winners (losers) in 1/8/2018 ended up as losers (winners) in 2/2/2018. Similarly, with respect to the 6/6/2018 – 7/6/2018 pairing we observe seven firms who were winners in 6/6/2018 ended up as losers in 7/6/2018. Moreover, eight firms who were losers in 6/6/2018 ended up as winners in 7/6/2018. These results highlight the fact that superior forecasting performance is certainly not consistent or persistent over time. In the two isolated cases where we found dependence, this dependence took the form of performance reversal, where winners became losers and losers became winners.

In sum, our results showed that there is no dependence between an analyst being in the “winning” group one month and again being in the winning group the next month. This means that the chance of an analyst to consistently be able to predict the data the USDA releases is pretty slim. From the perspective of an agricultural firm, it seems from our results that they may as well throw a dart to choose which private analyst forecast to follow. This result is consistent

with a large body of research in the finance literature, which has shown that stock market analysts are unable to consistently predict high performing stocks over time.

Conclusion and Discussion

Although our results fail to show evidence of superior forecasting skills by some analyst firms over others, this is perhaps not the end of the story. We only looked at the data from one angle, and there are many other ways the data could be interpreted or tested to uncover different results. For example, while persistent superior forecasting performance may be non-existent across all analyst firms, it is possible that sub-groups of analysts may have persistently superior forecasting skills. For example, if we performed the same predictability tests for just the top and bottom two forecasting firms, would we find consistently superior forecasting when comparing these sub-groups across time. Further research might also compare forecasting predictability across longer time-periods. For example, instead of analyzing predictability across adjacent months, analyst forecasts could be compared across crop years. Also, performance could be ranked under different criteria. For example, the direction of forecasts and forecast errors may be of more practical relevance to agricultural firms seeking guidance on their marketing and risk management decisions than absolute forecast accuracy. One approach would be to simulate trading strategies (going long of short futures) based on private analyst ending-stocks forecasts compared with the previous month's WASDE forecasts. The initial futures positions could subsequently be offset in the first trading session after a WASDE release. If such strategies produced statistically significant returns after accounting for risk and commission costs, this would provide evidence that some analyst firms' forecasts are economically valuable.

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Figure 1. Histogram of forecast error

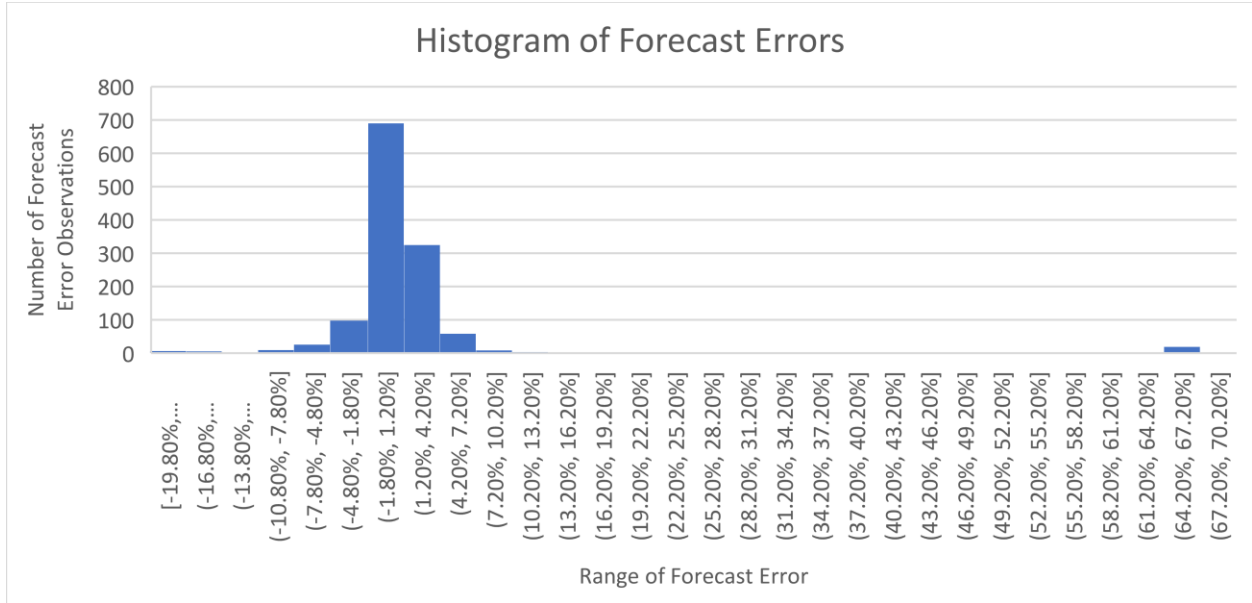


Table 1. Persistence or predictability of private analyst ending-stock forecasts based on winner and loser categories between adjacent pairs of WASDE release months, October 2016 – December 2021.

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
10/7/2016	11/4/2016	Winner t	3	4	1.00	0.59
		Loser t	4	3		
11/4/2016	12/5/2016	Winner t	3	4	1.00	0.59
		Loser t	4	3		
12/5/2016	1/5/2017	Winner t	3	6	0.15	0.09
		Loser t	6	2		
1/5/2017	2/3/2017	Winner t	5	2	0.29	0.11
		Loser t	2	5		
2/3/2017	3/3/2017	Winner t	5	6	1.00	0.83
		Loser t	5	5		
3/3/2017	4/6/2017	Winner t	7	3	0.18	0.07
		Loser t	3	7		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
4/6/2017	5/5/2017	Winner t	2	4	0.57	0.25
		Loser t	4	2		
5/5/2017	6/2/2017	Winner t	3	4	1.00	0.59
		Loser t	4	3		
6/2/2017	7/7/2017	Winner t	3	3	1.00	1.00
		Loser t	3	3		
7/7/2017	8/3/2017	Winner t	4	4	1.00	0.78
		Loser t	4	3		
8/3/2017	9/6/2017	Winner t	4	2	0.57	0.25
		Loser t	2	4		
9/6/2017	10/6/2017	Winner t	3	6	0.18	0.11
		Loser t	7	3		
10/6/2017	11/3/2017	Winner t	4	5	1.00	0.64
		Loser t	5	4		
11/3/2017	12/6/2017	Winner t	5	4	0.66	0.50
		Loser t	4	6		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
12/6/2017	1/8/2018	Winner t	6	4	0.37	0.25
		Loser t	3	6		
1/8/2018	2/2/2018	Winner t	2	7	0.06	0.02
		Loser t	7	2		
2/2/2018	3/2/2018	Winner t	6	3	0.35	0.16
		Loser t	3	6		
3/2/2018	4/6/2018	Winner t	6	3	0.35	0.23
		Loser t	3	5		
4/6/2018	5/7/2018	Winner t	3	5	0.62	0.32
		Loser t	5	3		
5/7/2018	6/6/2018	Winner t	5	3	0.62	0.32
		Loser t	3	5		
6/6/2018	7/6/2018	Winner t	3	7	0.09	0.05
		Loser t	8	3		
7/6/2018	8/6/2018	Winner t	4	5	1.00	0.64
		Loser t	5	4		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
8/6/2018	9/6/2018	Winner t	7	5	0.41	0.29
		Loser t	4	7		
9/6/2018	10/5/2018	Winner t	5	5	1.00	1.00
		Loser t	5	5		
10/5/2018	11/2/2018	Winner t	6	4	0.66	0.37
		Loser t	4	6		
11/2/2018	12/6/2018	Winner t	4	6	0.66	0.37
		Loser t	6	4		
12/6/2018	2/5/2019	Winner t	4	4	1.00	0.82
		Loser t	5	4		
2/5/2019	3/4/2019	Winner t	5	3	0.35	0.23
		Loser t	3	6		
3/4/2019	4/5/2019	Winner t	3	6	0.35	0.16
		Loser t	6	3		
4/5/2019	5/6/2019	Winner t	4	5	1.00	0.82
		Loser t	4	4		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
5/6/2019	6/5/2019	Winner t	3	6	0.18	0.11
		Loser t	7	3		
6/5/2019	7/8/2019	Winner t	4	5	0.66	0.50
		Loser t	6	4		
7/8/2019	8/6/2019	Winner t	4	5	1.00	0.64
		Loser t	5	4		
8/6/2019	9/6/2019	Winner t	6	3	0.35	0.16
		Loser t	3	6		
9/6/2019	10/4/2019	Winner t	5	5	1.00	0.83
		Loser t	6	5		
10/4/2019	11/4/2019	Winner t	6	3	0.35	0.16
		Loser t	3	6		
11/4/2019	12/5/2019	Winner t	4	4	1.00	1.00
		Loser t	4	4		
12/5/2019	1/6/2020	Winner t	6	4	0.39	0.28
		Loser t	4	7		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
1/6/2020	2/6/2020	Winner t	3	6	0.35	0.16
		Loser t	6	3		
2/6/2020	3/5/2020	Winner t	6	2	0.13	0.05
		Loser t	2	6		
3/5/2020	4/6/2020	Winner t	4	4	1.00	0.82
		Loser t	4	5		
4/6/2020	5/6/2020	Winner t	5	3	0.62	0.45
		Loser t	3	4		
5/6/2020	6/5/2020	Winner t	2	5	0.31	0.19
		Loser t	5	3		
6/5/2020	7/7/2020	Winner t	6	3	0.35	0.16
		Loser t	3	6		
7/7/2020	8/6/2020	Winner t	5	4	1.00	0.81
		Loser t	5	5		
8/6/2020	9/4/2020	Winner t	4	5	1.00	0.64
		Loser t	5	4		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
9/4/2020	10/5/2020	Winner t	4	5	1.00	0.64
		Loser t	5	4		
10/5/2020	11/5/2020	Winner t	4	5	1.00	0.64
		Loser t	5	4		
11/5/2020	12/4/2020	Winner t	3	6	0.35	0.16
		Loser t	6	3		
12/4/2020	1/7/2021	Winner t	5	4	0.66	0.50
		Loser t	4	6		
1/7/2021	2/4/2021	Winner t	5	4	0.64	0.46
		Loser t	3	5		
2/4/2021	3/4/2021	Winner t	6	3	0.35	0.23
		Loser t	3	5		
3/4/2021	4/5/2021	Winner t	6	4	0.67	0.51
		Loser t	5	6		
4/5/2021	5/6/2021	Winner t	4	3	0.62	0.45
		Loser t	3	5		

Month t	Month t+1		Winner t+1	Loser t+1	Fisher exact p-value	Chi-Square p-value
5/6/2021	6/4/2021	Winner t	4	3	0.59	0.39
		Loser t	2	4		
6/4/2021	7/7/2021	Winner t	4	3	1.00	0.60
		Loser t	3	4		
7/7/2021	8/6/2021	Winner t	4	4	1.00	0.82
		Loser t	5	4		
8/6/2021	9/3/2021	Winner t	5	5	1.00	0.81
		Loser t	4	5		
9/3/2021	10/6/2021	Winner t	4	5	1.00	0.64
		Loser t	5	4		
10/6/2021	11/3/2021	Winner t	5	4	1.00	0.81
		Loser t	5	5		
11/3/2021	12/3/2021	Winner t	4	4	1.00	1.00
		Loser t	4	4		