# The Announcement Effect of MFP and CFAP on Futures Commodity Prices

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## Abstract

This study examines the announcement impact of the Market Facilitation Program (MFP) and the Coronavirus Food Assistance Program (CFAP) on the corn and soybean futures contracts. This study aims to fill the existing research gap in understanding the announcement effects of a government program on the futures contracts of commodities, specifically for corn and soybeans. To achieve the goal, this study first examines whether the corn and soybean futures traded on MFP and CFAP announcement days exhibited differences in mean daily volumes or returns to trading by using multiple statistical tests (Isengildina-Massa et al., 2008b; Summer & Mueller, 1989). To identify the announcement effect, this study compares whether corn and soybean mean, and volatility of return and trade volumes are significantly different on days when announcements were made versus on regular days. Following Adjemian (2012) and Karali & Thurman (2009), this study further uses the two-stage GLS model to examine the announcement effects accounting for the effect of time-to-delivery due to the existence of multiple contracts for the same commodity, sharing the same features but with different expiration dates. Seasonality will also be controlled in the model so that this study can estimate the announcement effects over multiple delivery horizons (Adjemian, 2012). The results show that the announcement of MFP and CFAP programs does not significantly affect the corn and soybean futures traded volumes, and the return, indicating that USDA has successfully minimized the announcement's impact on the commodity market volatility.

JEL Codes: Q02, Q18

Keywords: announcement effect, government program, agricultural commodities

## 1. Introduction

The United States is the second largest agricultural trader globally (USDA ERS, 2024). Agricultural trade significantly improves the success rates and increases the profits of US farmers and businesses. However, in recent years, the sector has faced numerous unexpected shocks that influence trade and, consequently, hurt the profitability of US agricultural producers. In response to these challenges, the U.S. government has implemented multiple rounds of ad hoc programs, providing a platform for agricultural producers to participate and receive financial support.

This study then aims to study the announcement effect of government programs -- Market Facilitation Program (MFP) and Coronavirus Food Assistance Program (CFAP) -- on the corn and soybean futures. Both MFP and CFAP are government programs implemented by the U.S. Department of Agriculture (USDA), designed to provide financial aid to farmers affected by market disruptions and trade disputes, with a specific focus on agricultural commodities such as corn and soybeans.

In 2018, the USDA introduced the MFP to assist farmers experiencing losses resulting from unjustified foreign retaliatory tariffs. The program announced initially on August 27, 2018, was implemented in two rounds, one in 2018 and the other in 2019, with a total of five announcements. Both corn and soybean producers were beneficiaries of payments under both rounds of the MFP.

In response to the COVID-19 pandemic's impact on US producers, the USDA, in collaboration with the Small Business Administration (SBA), provided financial relief through the Coronavirus Aid, Relief, and Economic Security (CARES) Act. This USDA support came through multiple rounds of the CFAP. CFAP aimed to provide payments to producers who experienced a five percent or more decline in prices and/or additional marketing costs. CFAP disbursed over $23.5 billion, constituting 51 percent of the total direct payments in 2020. The program included

five announcements throughout the year, providing crucial financial support to the agricultural community during a challenging period.

By analyzing the announcement effects of both MFP and CFAP, this study seeks to understand the impact of such government financial support programs on agricultural futures markets. It is widely believed that these policy program announcements can affect commodity return volatility. However, it's also possible that the market anticipates government intervention aimed at addressing trade tariffs and the COVID-19 pandemic, resulting in these announcements providing little or no unexpected information. This could lead to reduced volatility, particularly in high-trust countries where public confidence in government intervention is prevalent (Bomfim, 2003; Engelhardt et al., 2021). The announcement then imply less volatility in high-trust countries (Engelhardt et al., 2021). Additionally, the timing of announcements may contribute to decreased volatility, as markets tend to exhibit lower conditional volatility in response to regularly scheduled policy announcements (Bomfim, 2003). While previous literature extensively explores announcement effects in various contexts, including announcement effect of monetary policy and financial information, on asset prices (Rigobon & Sack, 2004), stock markets (Christiansen & Ranaldo, 2007), and commodity prices (Scrimgeour, 2015), and examines the announcement effects of information releases by USDA, such as the World Agricultural Supply and Demand Estimates (WASDE) and outlook information, on commodity prices (Isengildina et al., 2006; Isengildina-Massa et al., 2008b, 2008a; Summer & Mueller, 1989). However, there remains a gap in understanding the announcement effects of government financial support programs on commodity futures contracts, particularly for corn and soybeans, and evaluating the effectiveness of government efforts to minimize these effects.

To address this gap, this study initially investigates whether there was a reaction in the traded volumes and returns of corn and soybeans to the announcements of MFP and CFAP. This examination employs various statistical tests, as demonstrated by previous research (Isengildina-Massa et al., 2008a, 2008b; Summer & Mueller, 1989). To identify the announcement effect, this study compares whether corn and soybean returns, and traded volumes are significantly different on days when announcements were made versus on pre- and post- announcement days. Following Adjemian (2012) and Karali & Thurman (2009), this study further uses the two-stage GLS model to examine the announcement effects, accounting for the time to delivery, where multiple contracts exist for the same commodity, sharing all the same features except the delivery day. Seasonality is also be controlled to estimate the announcement effects of MFP and CFAP on the corn and soybean futures contracts over multiple delivery horizons (Adjemian, 2012). Our findings indicate that both the MFP and CFAP announcements are followed by insignificant volatility on traded volumes and return for nearest-to-maturity futures contracts. Given that USDA aims to minimize the impact of government program announcement on the market, the government has reached their goals on controlling the fluctuation of the market.

This paper should be of interest to several stakeholders, including policymakers and program designers at the USDA. By examining the potential impact of government announcements on the commodity futures market for corn and soybeans, this study offers valuable insights that could inform policy adjustments to reduce market volatility. Increased volatility in futures prices due to traders' changing profit expectations from the announcement can influence the crop returns, which in turn may affect planting decisions. It's important to note that changing planting decisions based on a certain ad hoc program may not comply with World Trade Organization regulations, which aim to prevent countries from influencing producer behavior through new programs.

Despite these considerations, little is understood about whether there is any impact on futures prices, which can have implications for producers as well as policy makers. This paper aims to fill this gap and the findings could be informative to USDA as they announce new programs in the future. For instance, the Inflation Reduction Act (IRA) provides approximately $19.5 billion to fund USDA's conservation programs. USDA will likely design new programs to disburse these payments.

## 2. Background

MFP and CFAP are the two programs designed to provide financial aid to farmers affected by market disruptions and trade disputes, with a specific focus on agricultural commodities such as corn and soybeans. Table 1 provides details of all the announcement dates for both programs. MFP is part of a broader USDA effort to assist producers whose commodities have been directly impacted by tariffs. The program was implemented in 2018 and 2019, with a total of five announcements. The first announcement of each year is about the payment structure and rate of payment by commodity. The later announcements are about the payment details. In response to the COVID-19 pandemic's impact on US producers, CFAP aimed to provide payments to producers who experienced a five percent or more decline in prices and/or additional marketing costs. CFAP disbursed over $23.5 billion, constituting 51 percent of the total direct payments in 2020. The program included five announcements throughout the year, providing crucial financial support to the agricultural community during a challenging period.

Since both programs are designed to provide financial aid to farmers affected by market disruptions and trade disputes, with a specific focus on agricultural commodities such as corn and soybeans, this study combines the announcements to analyze the announcement effect of such government financial aid programs on corn and soybean futures. This approach is taken as

producers of both commodities benefit from both programs. Focusing solely on one program would result in a lack of announcements to observe the effect comprehensively.

[Table 1 inserted here]

## 3. Literature Review

Our analysis aims to investigate how corn and soybean futures contract are affected by the announcement of government financial support programs like CFAP and MFP, specifically, we focus on examining changes on mean and volatility in futures return and traded volumes on announcement days.

Large body literature has focused on the impact of information released and announced by USDA, such as forecast reports (Adjemian, 2012; Adjemian & Irwin, 2020; Dorfman & Karali, 2015; Garcia et al., 1997; Isengildina et al., 2006; Isengildina-Massa et al., 2008a, 2008a; McKenzie & Ke, 2022; Summer & Mueller, 1989). Using daily data, they study the return and volatility due to the forecast report and news release. They find that the news and forecast reports released is associated with more volatilities in the futures return and the commodity markets do respond to the reports released. Additionally, there is a well-documented literature focusing on the announcement effects of monetary policy on financial markets (Christiansen & Ranaldo, 2007; Rigobon & Sack, 2004). Typically, these announcement effects arise due to information asymmetry, trader competition, and market expectations (Adjemian & Irwin, 2018).

While extensive literature exists on the documented impact of new information as well as new government programs, there is a gap when it comes to understanding the announcement effects of a government financial support program on the futures contracts of commodities, specifically for corn and soybeans. Therefore, our study aims to address this research gap. Given the USDA's efforts to manage the impact of its reports on commodity market volatility, we seek to determine

whether the announcements of government programs such as CFAP and MFP induce any volatility in traded volumes or return for corn and soybeans. Building on previous literature, we consider the reactions for both nearest-to-maturity contracts and all contracts available for trading during the study period. This approach allows us to capture the full extent of the announcement effects on corn and soybean futures contracts.

## 4. Data

In order to understand the announcement effect of both MFP and CFAP, we start with defining the "events" analyzed to be all the announcement dates of MFP and CFAP, spanning from 2018 to the end of 2020. The specific dates for MFP and CFAP announcements are provided in Table 1, with each program having a total of 5 announcements.

To evaluate the impact of these announcements on corn and soybean futures contracts, we collect daily trading data from Barchart[1], including traded volumes, opening and closing futures return. Our dataset comprises a total of 26 corn futures contracts and 33 soybean futures contracts. Prior research suggests using the nearest-to-maturity for two main reasons—they are the most heavily traded and liquid contracts, and they can reflect the price impact of new and old crop information (Adjemian, 2012; Isengildina et al., 2006; Isengildina-Massa et al., 2008a; Working, 1948). Among all futures contracts, we include 8 nearest-to-maturity corn contracts[2] and 8 nearest-to-maturity soybean contracts[3].

[1] For corn futures, we have included ZCU18, ZCH19, ZCU19, ZCZ19, ZCH20, ZCK20, ZCN20, ZCZ20, ZCH18, ZCK18, ZCN18, ZCZ18, ZCK19, ZCN19, ZCU20, ZCH21, ZCK21, ZCN21, ZCU21, ZCZ21, ZCH22, ZCK22, ZCN22, ZCU22, ZCZ22, ZCH23. For soybean futures, we have ZSU18, ZSF19, ZSQ19, ZSF20, ZSH20, ZSK20, ZSN20, ZSX20, ZSH18, ZSK18, ZSN18, ZSQ18, ZSX18, ZSH19, ZSK19, ZSN19, ZSX19, ZSU20, ZSF21, ZSH21, ZSK21, ZSN21, ZSQ21, ZSU21, ZSX21, ZSF22, ZSH22, ZSK22, ZSN22, ZSQ22, ZSU22, ZSX22, ZSF23.

[2] ZCU18 (September 2018), ZCH19 (March 2019), ZCU19 (September 2019), ZCZ19 (December 2019), ZCH20 (March 2020), ZCK20 (May 2020), ZCN20 (July 2020), and ZCZ20 (December 2020)

[3] ZSU18 (September 2018), ZSF19 (January 2019), ZSQ19 (August 2019), ZSF20 (January 2020), ZSH20 (March 2020), ZSK20 (May 2020), ZSN20 (July 2020), and ZSX20 (November 2020)

Additionally, we incorporate inventory data sourced from quarterly Grain Stocks reports published by the National Agricultural Statistics Service (NASS) into our analysis.

## 5. Methodology

### 5.1. Statistical Tests

The efficient market hypothesis suggests that futures prices exhibit heightened volatility on important policy or news announcement days, with normal volatility observed on non-announcement days (Isengildina-Massa et al., 2008b; Summer & Mueller, 1989). This phenomenon can be due to the potential impact of announcements on changing market participants' expectations. In an efficient market, futures prices are expected to reflect the anticipated return of not trading immediately using the spot price. There are arguments suggesting that the announcement of programs such as MFP and CFAP can indeed induce volatility on the announcement dates. Conversely, in cases where announcements are anticipated, particularly in high-trust countries, such announcements may not necessarily result in volatility in the futures commodity market (Bomfim, 2003; Boulland & Dessaint, 2017; Engelhardt et al., 2021). This study seeks to investigate whether the announcement of government financial support program like MFP and CFAP can affect the corn and soybean futures market.

Following Isengildina-Massa et al. (2008b) and Summer & Mueller (1989), we use statistical tests to check whether the variability of corn and soybean return variance around announcement days is smaller than it is on announcement days. To start with the test, we set a time index (t) and event index (i). The time index is $t = -5, -4, -3, -2, -1, 0, +1, +2, +3, +4, +5$, where $t = 0$ indicates the announcement day. Negative time indexes are days before the announcement day, while positive time index indicates days after the announcement day. "+2" then implies 2 days after the announcement day trading. The event index is $i = 1,2, \dots \dots ,10$, where 1 indicates the

MFP announcement on August 27, 2018, and 10 indicates the CFAP announcement on September 15, 2020. As the program announcements are usually taken place within the daily trading sessions, close-to-open futures returns are first calculated as follows:

$$r_{i,t} = \ln\left(\frac{p^{o}_{t,i}}{p^{c}_{t-1,i}}\right) * 100, t = -5, \dots\dots, 0, +5 \quad (1)$$

$p^{o}_{t,i}$ is the opening price of the nearest-to-maturity corn or soybean futures contract for day $t$ and event $i$. $p^{c}_{t-1,i}$ is the closing price of the nearest-to-maturity corn or soybean futures contract for day $t-1$ and event $i$. Close-to-close return is also calculated to ensure the robustness of the result. The total length of the event window is 10.

Before proceeding to the statistical tests, it's crucial to first test the normality of the data to ensure the appropriate application of parametric and non-parametric tests. Descriptive statistics for corn and soybeans, including close-to-open and close-to-close returns, are presented in Table 2 and Table 3. These statistics reveal significant skewness and kurtosis across all series, indicating a departure from normality. We next conduct Jarque-Bera tests to provide more evidence on the normality. As a result, we reject the normality for all the cases, further corroborating the non-normality of the data.

[Table 2, 3 inserted here]

Following similar procedures, we present the descriptive statistics for corn and soybean futures contract traded volumes in Tables 4 and 5. These tables reveal significant skewness and kurtosis, indicating non- normality. We also conduct Jarque-Bera tests, which resulted in rejections of the null hypothesis of normality.

[Table 4, 5 inserted here]

In this case, non-parametric tests are recommended. The Wilcoxon rank-sum test, the Van der Waerden test, and the Kruskal-Wallis rank-sum test have been conducted to determine whether the volatility and mean of return, as well as traded volumes, differ significantly from those on pre- and post-announcement dates. Specifically, the null hypothesis is that the variability of returns or the traded volumes or the mean of the return is equal for announcement days and the days before and after announcements. Additionally, parametric tests, such as t-tests and F-tests, are also conducted to serve as a robustness check.

## 6. Results

To assess whether there are significant differences in the volatility and mean return of corn and soybean futures on announcement days compared to regular trading days, we conducted both parametric and non-parametric tests. The results, presented in Tables 6 and 7, show the outcomes of T-tests, F-tests, Wilcoxon rank-sum tests, Van der Waerden tests, and Kruskal-Wallis rank-sum tests. Given the rejection of normality assumptions, we rely more on the results from non-parametric tests.

An interesting finding is that, for both corn and soybean cases, we fail to reject the null hypothesis across all measures, including return, absolute return, and volatility. This suggests that there is no significant difference in the mean return or volatility between announcement days and regular trading days for corn and soybean futures. These findings indicate that the announcement of MFP and CFAP programs did not induce greater volatility in the futures markets for corn and soybeans.

[Table 6, 7 inserted here]

Additionally, this study explores whether traded volumes demonstrate consistent patterns compared to corn and soybean return. Tables 8 and 9 present the results of statistical tests for corn and soybean traded volumes, where both parametric and non-parametric tests were utilized. Similar to the findings for return, no significant differences were observed in the mean and volatility of traded volumes on announcement dates compared to pre- and post-announcement dates for both commodities. This suggests that the announcement of government programs did not exert a substantial impact on trading volumes in the corn and soybean futures markets. Overall, these results suggest that the announcements of MFP and CFAP do not significantly lead to volatility in the corn and soybean futures market. This indicates that the announcements may align with market expectations, and traders may trust government intervention to stabilize the market facing challenges such as the US-China trade war and the COVID-19 pandemic. Consequently, there may be no immediate need for USDA to further adjust the timing of these government financial support programs announcements to minimize market volatility.

[Table 8, 9 inserted here]

## 7. Conclusion

This study offers a comprehensive analysis of the announcement effect of government financial support programs, such as MFP and CFAP, on corn and soybean futures contracts. Specifically, it focuses on assessing the volatility and mean of futures returns and traded volumes on announcement dates compared to non-announcement days. Data on daily futures contracts traded from 2018 to the end of 2020 are obtained from Barchart.com. Nearest-to-maturity contracts are also used for a separate analysis, given their effectiveness in reflecting market information.

Test including T-tests, F-tests, Wilcoxon rank-sum tests, Van der Waerden tests, and Kruskal-Wallis rank-sum tests are used to study whether there are differences in return and traded volumes between announcement days and non-announcement days in terms of mean and volatility. The

findings indicate that both MFP and CFAP announcements do not lead to significant differences in volatility and mean of traded volumes and returns for nearest-to-maturity futures contracts. These results offer some evidence that these announcements may under the market expectations, and government intervention are trusted and expected by the market participants to combat the challenges like the US-China trade war and the COVID-19 pandemic. In this case, it is not necessary for USDA to further adjust the timing of such government financial support programs announcements to mitigate abnormal market volatility. Furthermore, it addresses a gap in the literature concerning the impact of government program announcements on commodity futures markets. The insights provided by this study could inform the design and implementation of future USDA programs.

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## Tables and Figures

Table 1

| Program | Date | Details |
|---|---|---|
| 2018 MFP | August 27, 2018 | Announcement of payment structure which included payments would be in tranches and rate of payment by commodity. |
| 2018 MFP | December 17, 2018 | Announcement of second and final tranche payments. |
| 2019 MFP | July 25, 2019 | Announcement of MFP 2019 payment structure which stated payments would be made in three tranches. |
| 2019 MFP | November 15, 2019 | Announcement of second tranche of payments. |
| 2019 MFP | Feb 3, 2020 | Announcement of the third and final tranche of payments. |
| CFAP 1 | April 17, 2020 | Announcement of CFAP 1 and total amount allocated for the program. |
| CFAP 1 | May 14, 2020 | Release of cost-benefit analysis which included payment rate by commodity. |
| CFAP 1 | May 19, 2020 | The second release is about the CFAP 1 along with more details. |
| CFAP 2 | September 18, 2020 | Announcement of CFAP 2 |
| CFAP 2 | Sept. 15, 2020 | Release of cost-benefit analysis which included payment rate by commodity. |

Table 2: Descriptive statistics for corn return

| Corn | Mean | Median | Variance | Skewness | Kurtosis | Count |
|---|---|---|---|---|---|---|
| Close to open | | | | | | |
| Return | -0.00326 | -0.0562 | 0.139 | 1.56 | 24.5 | 1024 |
| Absolute Return | 0.214 | 0.130 | 0.0932 | 5.59 | 38.3 | 1024 |
| Close to close | | | | | | |
| Return | -0.0643 | -0.0660 | 1.76 | -0.0736 | 5.03 | 1025 |
| Absolute Return | 0.979 | 0.727 | 0.807 | 1.84 | 7.54 | 1025 |

Table 3: Descriptive statistics for soybean return

| Soybean | Mean | Median | Variance | Skewness | Kurtosis | Count |
|---|---|---|---|---|---|---|
| Close to open | | | | | | |
| Return | 0.0029 | 0 | 0.0822 | 1.08 | 20 | 1024 |
| Absolute Return | 0.164 | 0.878 | 0.0552 | 4.13 | 29.7 | 1024 |
| Close to close | | | | | | |
| Return | -0.0274 | 0 | 0.991 | 0.0858 | 5.06 | 1024 |
| Absolute Return | 0.732 | 0.522 | 0.455 | 1.81 | 7.62 | 1024 |

Table 4: Descriptive statistics for corn trade volume

| Corn | Mean | Median | Variance | Skewness | Kurtosis | Count |
|---|---|---|---|---|---|---|
| | 118820 | 116728 | 6149234486 | 0.61419 | 3.520236 | 1032 |

Table 5: Descriptive statistics for soybean trade volume

| Soybean | Mean | Median | Variance | Skewness | Kurtosis | Count |
|---|---|---|---|---|---|---|
| | 5335.29 | 135881.5 | 2391491652 | 1.087 | 3.90 | 1032 |

Table 6: Tests on return and volatility for corn return

| Test/p-values | Return | Absolute Return | Volatility |
|---|---|---|---|
| Close to open | | | |
| T test | 0.2325 | 0.01086** | |
| Wilcoxon rank-sum test | 0.1559 | 0.02385** | |
| Van der Waerden test | 0.3359 | 0.3767 | 0.3916 |
| Kruskal-Wallis rank sum test | 0.3286 | 0.3958 | |
| F test | | | 2.707e-08*** |
| Close to close | | | |
| T test | 0.1064 | 0.1432 | |
| Wilcoxon rank-sum test | 0.08298* | 0.1049 | |
| Van der Waerden test | 0.4289 | 0.4289 | 0.3916 |
| Kruskal-Wallis rank sum test | 0.4289 | 0.4289 | |
| F test | | | 0.02101** |

Table 7: Tests on return and volatility for soybean return

| Test/p-values | Return | Absolute Return | Volatility |
|---|---|---|---|
| Close to open | | | |
| T test | 0.7306 | 0.4242 | |
| Wilcoxon rank-sum test | 0.7209 | 0.5054 | |
| Van der Waerden test | 0.4289 | 0.4289 | 0.406 |
| Kruskal-Wallis rank sum test | 0.4289 | 0.4289 | |
| F test | | | 0.4617 |
| Close to close | | | |
| T test | 0.5967 | 0.2011 | |
| Wilcoxon rank-sum test | 0.9591 | 0.1949 | |
| Van der Waerden test | 0.4289 | 0.4289 | 0.406 |
| Kruskal-Wallis rank sum test | 0.4289 | 0.4289 | |
| F test | | | 0.037** |

Table 8: Tests on mean and volatility for corn trade volume

| Test/p-values | Trade volume | Absolute trade volume | Volatility |
|---|---|---|---|
| T test | 0.6285 | 0.6285 | |
| Wilcoxon rank-sum test | 0.6285 | 0.6285 | |
| Van der Waerden test | 0.4289 | 0.4289 | 0.406 |
| Kruskal-Wallis rank sum test | 0.4289 | 0.4289 | |
| F test | | | 0.3616 |

Table 9: Tests on mean and volatility for soybean trade volume

| Test/p-values | Trade volume | Absolute trade volume | Volatility |
|---|---|---|---|
| T test | 0.8801 | 0.8801 | |
| Wilcoxon rank-sum test | 0.9591 | 0.9591 | |
| Van der Waerden test | 0.4289 | 0.4289 | 0.4159 |
| Kruskal-Wallis rank sum test | 0.4289 | 0.4289 | |
| F test | | | 0.3811 |