

Speculative Positioning and Market Liquidity in Agricultural Futures During the Covid-19 Pandemic: Evidence from CBOT Commitments of Traders Data

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ABSTRACT

The COVID-19 pandemic intensified disruptions across global agricultural markets, raising concerns about the growing disconnect between physical commodity fundamentals and futures market dynamics. This study investigates changes in liquidity and speculative activity in the main agricultural futures contracts traded on the Chicago Board of Trade (CBOT)—corn, soybeans, wheat (HRW and SRW), and rough rice—using disaggregated Commitments of Traders (COT) data published by the Commodity Futures Trading Commission (CFTC) for the period 2019–2025.

The analysis compares three distinct phases: the pre-pandemic period (2019), the pandemic peak (2020–2021), and the post-pandemic period (2022–2025). Changes in Open Interest (OI), trader positioning, speculative participation, and the relationship between market liquidity and trading behaviour are examined through descriptive and correlational measures, with indicators normalised to ensure comparability across periods.

Results indicate that cumulative OI expanded significantly in the post-pandemic phase, representing 53.7% of cumulative Open Interest across the sample, while average OI declined by 9.1% relative to pre-COVID levels, suggesting a temporary compression of market liquidity. Commercial hedgers maintained persistently negative net positions (average: -113,762 contracts), confirming their stabilising and counter-cyclical role. Conversely, speculative traders exhibited strongly pro-cyclical behaviour during the pandemic peak, with positive correlations between OI and net positions reaching 0.87. Swap dealers and index funds acted respectively as systemic intermediaries and passive amplifiers of market dynamics. Although the speculative share of OI declined during the most acute phase of the crisis, it subsequently recovered as market conditions normalised.

The findings suggest that the pandemic reinforced the financialization of agricultural commodity markets without generating destabilising speculative spirals. Nevertheless, increased financial participation may have heightened the vulnerability of net food-importing countries to price shocks. The study highlights the importance of transparency-enhancing regulatory frameworks (CFTC, MiFID II) and of distinguishing between risk-management activities and passive financial flows in commodity market governance.

Keywords: Agricultural futures, Commitments of Traders, COVID-19, Financialization, Market liquidity, Food security

INTRODUCTION

The present work provides an in-depth analysis of the structure of agricultural commodity futures markets, focusing on corn, soybeans, rice and wheat traded on the Chicago Board of Trade (CBOT). The analysis draws primarily on the Commitments of Traders (COT) Reports, published weekly by the Commodity Futures Trading Commission (CFTC), and assesses the impact of the COVID-19 pandemic on market participant behaviours and on liquidity dynamics.

The study used COT data covering the period 2019–2025 (up to September 2025), structured according to a tripartite temporal framework: Pre-COVID (2019), Pandemic Peak (2020–2021) and Post-Pandemic (2022–2025). To ensure comparability across periods, analysis was performed using a harmonized dataset (“f_years_2019–2025”). The variables considered included: cumulative and average open interest (OI); net positions (defined as the difference between long and short positions) per trader category (hedgers, speculators/money managers, swap dealers and other reportables); the percentage share of OI held by speculators; measures of volatility (standard deviation); correlations between net positions and OI; and average percentage changes.

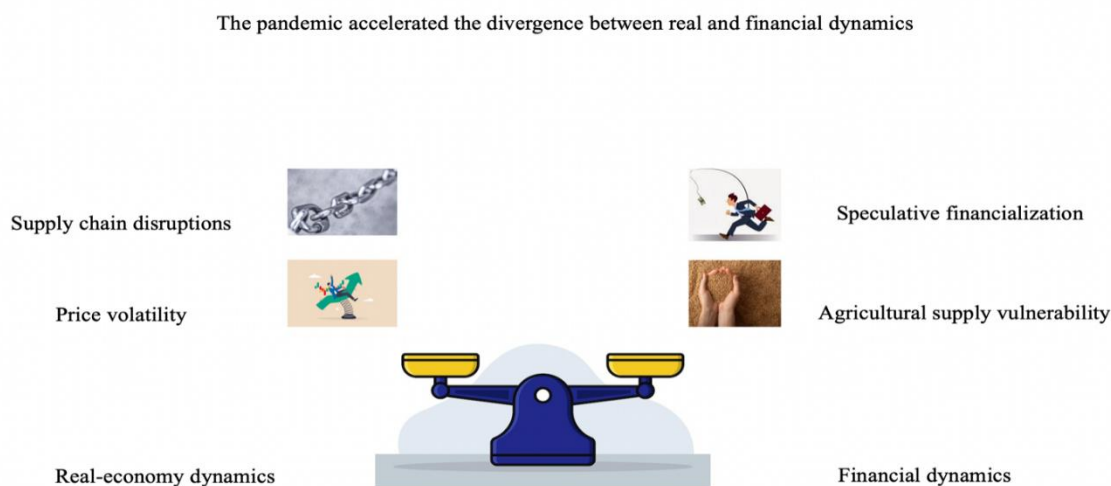
To avoid distortions arising from the unequal duration of the temporal sub-periods (one year for Pre-COVID, two years for the Pandemic Peak, and four years for the Post-COVID phase), percentage comparisons were normalised with respect to the length of each period.

The results show that although cumulative OI increased significantly in the Post-Pandemic period—consistent with the growing financialization of commodity markets—average OI tended to decline, suggesting an initial reduction in liquidity during the Pandemic Peak. The analysis of net positions and correlations reveals heterogeneous behavioural patterns:

- Hedgers Adopted Predominantly Defensive Strategies, Marked By Negative Correlations With The OI;
- Speculators, Swap Dealers, And Other Financial Participants Exhibited More Volatile And Shock-Sensitive Responses, Contributing To The Realignment Or Amplification Of Volatility In The Different Market Segments.

Overall, the empirical evidence supports the central hypothesis of this work, namely, that the pandemic accentuated the divergence between real dynamics (supply chain disruptions) and financial dynamics (the increasing financialization of markets), with significant implications in terms of agricultural price volatility and food security in countries with net-imports.

Figure 1 Summary Scheme Showing the Impacts of the COVID-19 Pandemic



Source: created by the author.

MATERIALS AND METHODS

Data Sources and Sample

The analysis relies exclusively on secondary data from the Commodity Futures Trading Commission (CFTC) Disaggregated Futures Only Reports (Historical Compressed files, f_year_YYYY.xls). These official weekly

reports provide detailed trader position data for U.S. futures markets. The study covers the period January 2019 to September 2025 (partial year for 2025) and focuses on five major agricultural commodities traded on the Chicago Board of Trade (CBOT): CORN, SOYBEANS, WHEAT-HRW (Hard Red Winter), WHEAT-SRW (Soft Red Winter) and ROUGH RICE. These contracts were selected for their high open interest, global relevance to food security, and complete data availability. From an initial universe of 266 markets, only these five were retained after applying explicit inclusion criteria based on volume, liquidity, and direct connection to staple food supply chains.

Data Processing and Variable Construction

Seven annual compressed files were downloaded from the official CFTC [1] portal and merged using Microsoft Excel (Power Query). The original files contained 188 columns. Following a transparent selection protocol (detailed in the supplementary data legend), the dataset was reduced to approximately 20 essential variables to ensure analytical focus and computational efficiency. Retained columns included market identifiers, report dates, total open interest (Open_Interest_All), and long/short positions for the four main trader categories: Producer/Merchant (hedgers), Managed Money (speculators), Swap Dealers, and Other Reportables (primarily index funds).

Derived variables were calculated as follows:

- Net positions for each category (Long – Short).
- Percentage of open interest held by speculators ($\%_{OI_Spec} = (\text{Managed Money Long} + \text{Short}) / \text{Open Interest} \times 100$).
- Temporal period labels (1 = Pre-COVID, 2 = Pandemic Peak, 3 = Post-Pandemic).
- Weekly changes in open interest and positions.

The complete variable selection protocol, list of excluded columns, and derivation formulas for all constructed indicators are documented in the supplementary data legend file, which is available from the authors upon reasonable request to guarantee full reproducibility.

Analytical Framework and Statistical Techniques

The methodological approach is quantitative, descriptive, and correlational. No forecasting models or advanced econometric estimations were applied. The core techniques included:

- Descriptive statistics (means, cumulative sums, standard deviations) of open interest and net positions, calculated both in absolute terms and normalised for unequal period lengths.
- Comparative analysis across the three pandemic-related sub-periods and across the five commodities.
- Pearson correlation coefficients (CORREL function) between total open interest and net positions of each trader category, computed separately for each sub-period and commodity.
- Percentage changes in average open interest and net positions between periods.
- Volatility assessment via standard deviation of weekly open interest.

All calculations were performed in Microsoft Excel using Pivot Tables for aggregation, standard formulas for derived metrics, and built-in statistical functions. Seven annual compressed COT files were merged, resulting in a raw dataset of 7,907 weekly observations across 25 markets. After applying the inclusion criteria (high open interest, global relevance to food security, and complete data availability), the final analytical sample was restricted to the five CBOT agricultural contracts under study (corn, soybeans, HRW wheat, SRW wheat and

rough rice). The final cleaned dataset comprises 1,755 weekly observations covering the period from January 2019 to September 2025.

Periodisation and Normalisation

To isolate pandemic effects, the sample was explicitly segmented into Pre-COVID (2019), Pandemic Peak (2020–2021), and Post-Pandemic (2022–2025) phases. Averages and correlations were interpreted with awareness of the different lengths of these intervals; percentage changes and normalised metrics were used where appropriate to ensure comparability.

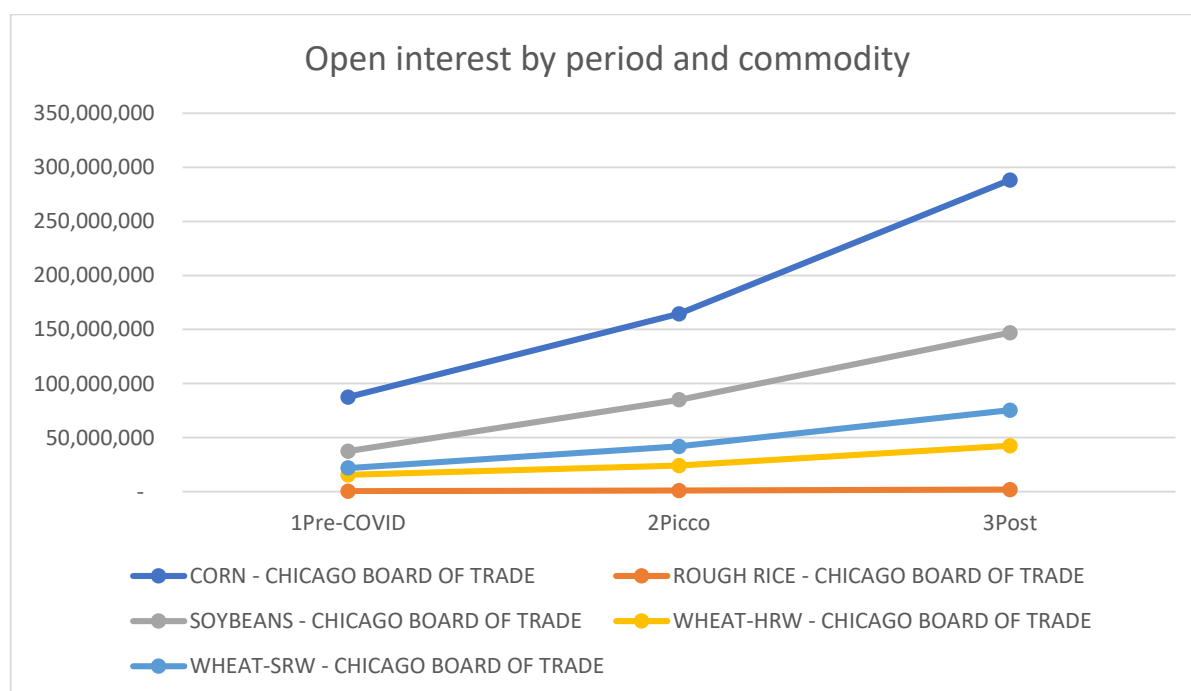
To ensure comparability across sub-periods of unequal length, percentage changes and normalised metrics were calculated by dividing cumulative or summed values by the number of weeks in each phase. Average open interest and volatility figures are simple arithmetic means of weekly observations; they should therefore be interpreted as period-specific liquidity levels rather than strictly annualised measures. This approach avoids distortions arising from the different durations (52 weeks in 2019, 104 weeks in 2020–2021, and approximately 200 weeks in 2022–September 2025).

RESULTS

A) Trends in Open Interest

Total cumulative open interest reached 1,034.1 million contracts (or approximately 1.034 billion contracts) over the period examined and exhibited a three-phase evolution mirroring the macroeconomic trajectories associated with the pandemic. As shown in Table 1.3, aggregate open interest in the Pre-COVID period amounted to 162.7 million contracts, representing 15.7% of the total and reflecting a pre-shock balance between commercial hedging and moderate speculative activity. During the Pandemic Peak, open interest surged to 316.5 million contracts (30.6% of the total), corresponding to a normalised annual increase of 94.5%, consistent with the rise in volatility driven by supply-chain disruptions and reactive speculative strategies [2]. In the Post-Pandemic period, open interest reached 554.9 million contracts (53.7% of the total), marking an increase of 75.2% relative to the pandemic peak, suggesting a partial yet persistent normalisation of financialization, supported by capital inflows from index funds [3].

Graph 1 – Open Interest by Period as Traded on the Chicago Board of Trade



Source: Author's own elaboration of CFTC data, years 2019–2025.

Table 1 – Cumulative Open Interest by Period and Commodity (number of contracts, expressed in millions)

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Total
CORN	87.4	164.4	288.2	540.0
SOYBEANS	37.4	85.0	147.0	269.4
WHEAT HRW	15.6	24.1	42.5	82.2
WHEAT SRW	21.9	41.9	75.3	139.1
ROUGH RICE	0.4	1.0	1.9	3.4
Total	162.7	316.5	554.9	1,034.1

Source: Author's own elaboration of CFTC data, years 2019–2025.

Note: Values were rounded for the sake of simplification.

Table 2 – Average Weekly Open Interest by Period and Commodity (number of contracts)

COMMODITY (as Traded on CBoT)	PERIOD			
	1Pre-COVID	2Peak	3Post	Average
CORN	1,681,301	1,580,721	1,477,953	1,538,528
ROUGH RICE	8,271	9,727	9,872	9,592
SOYBEANS	719,000	817,481	753,884	767,559
WHEAT-HRW	299,787	232,189	217,863	234,245
WHEAT-SRW	421,208	403,221	386,048	396,345
Average	625,913	608,667	569,124	589,254

Source: Author's own elaboration of CFTC data, years 2019–2025.

The dynamics of average open interest (calculated as the arithmetic mean of weekly total Open Interest values) display a differentiated evolution across the three periods analysed, reflecting the progressive effects of the pandemic on participation in agricultural futures markets. It should be noted that the Pre-COVID, Pandemic Peak and Post-Pandemic periods cover different time intervals (1, 2 and 4 years, respectively). Consequently, the averages should be interpreted with caution, since the differing number of observations tends to smooth out extreme annual variations.¹

In the Pre-COVID period, aggregate average open interest reached 625,913 contracts (approximately 35.5% of the overall total), outlining a context of high liquidity and stability, consistent with a system dominated by structural hedging activity and moderate speculative participation.

During the Pandemic Peak, average open interest declined to 608,667 contracts (approximately 34.3% of the total), recording a decrease of 2.7% relative to the pre-crisis level. This contraction reflects the initial phase of operational and logistical-financial disruption generated by the health emergency, characterised by a temporary reduction in trading activity and an increase in risk aversion, as also highlighted in CFTC reports from 2020–2021.

In the Post-Pandemic phase, average open interest declined further to 569,124 contracts (approximately 32.2% of the total), a fall of 6.5% relative to the Peak period and 9.1% compared with the Pre-COVID period. This reduction indicates an incomplete normalisation of the markets, with a structurally lower level of participation

¹ Average open interest is sensitive to both the duration of the periods considered and the presence of weekly outliers. To ensure an accurate interpretation of the results, these values should be understood as structural indicators of market participation rather than as percentage shares of individual contracts relative to a total.

that may be interpreted as a more cautious equilibrium, shaped by macroeconomic uncertainty, geopolitical tensions and persistent climate-related risks [4].

At the sectoral level, significant differences emerge in the structure of open interest:

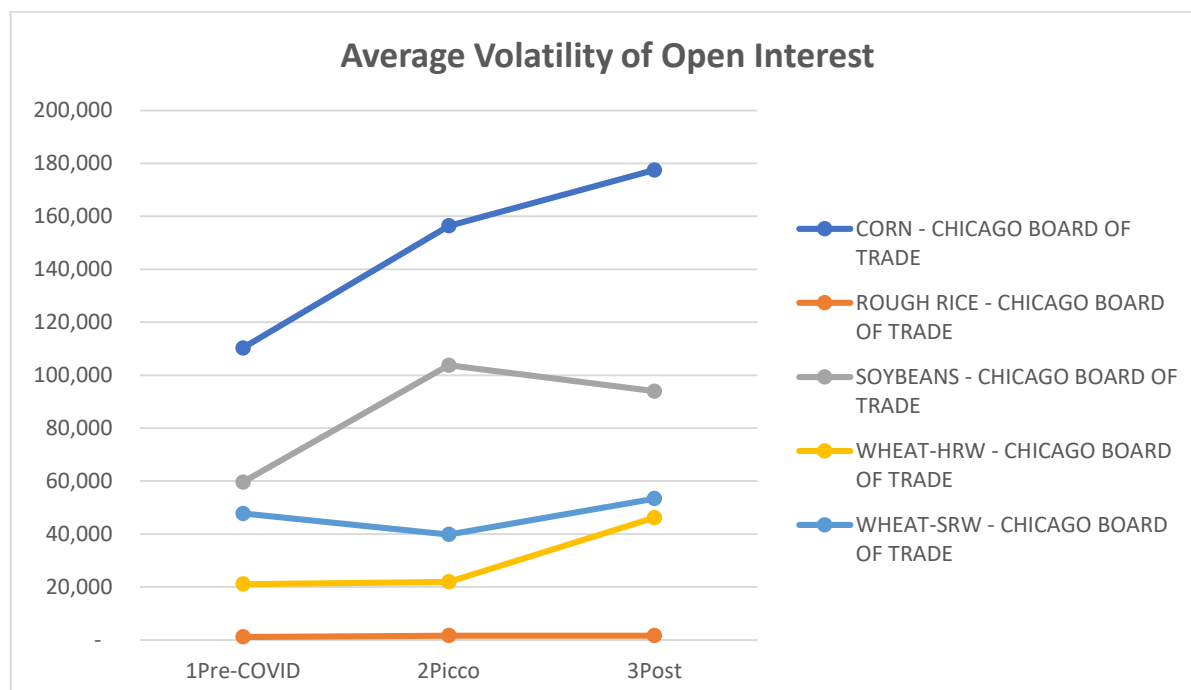
- corn records very high average levels (approximately 1.54 million contracts), making it the commodity with the highest degree of financial participation;
- soybeans follow with average values exceeding 760,000 contracts, confirming their role as a global benchmark market;
- wheat contracts (HRW and SRW combined as an aggregate value) total more than 630,000 contracts, indicating an intermediate level of market activity while remaining sensitive to systemic shocks;
- rice, with an average of approximately 9,600 contracts, remains a niche market characterised by intrinsically limited liquidity and therefore more exposed to sharp fluctuations under conditions of market stress.

These findings confirm the highly concentrated structure of agricultural derivatives markets, in which a small number of high-volume commodities act as liquidity “anchors”, while smaller markets such as rice display more vulnerable profiles.

It may therefore be asserted that the pandemic generated a temporary but significant contraction in average open interest, highlighting a growing divergence between real-economy and financial dynamics.

On the one hand, the real-economy effects (production disruptions, logistical restrictions and declines in physical supply) created tensions in the effective availability of commodities; on the other hand, financial dynamics (reduced liquidity, the partial withdrawal of speculative operators and rising hedging costs) compressed the functioning of derivatives markets. In particular, the contraction of open interest in highly liquid markets such as corn and soybeans reduced the ability of commercial operators to transfer risk efficiently, thereby amplifying perceived volatility in spot markets.

Graph 2 – Average Volatility of Open Interest



Source: Author’s own elaboration of CFTC data, years 2019–2025.

Table 3 – Open Interest Volatility by Period and Commodity (number of contracts, expressed in millions)

COMMODITY (as Traded on CBoT)	PERIOD			
	1Pre-COVID	2Peak	3Post	Total Std. Dev.
CORN	110,268	156,390	177,519	178,993
ROUGH RICE	1,134	1,604	1,621	1,646
SOYBEANS	59,601	103,726	93,946	98,848
WHEAT-HRW	21,068	21,934	46,142	46,641
WHEAT-SRW	47,755	39,813	53,336	50,403
Overall volatility	579,100	560,556	524,645	543,950

Source: Author's own elaboration of CFTC data, years 2019–2025.

The standard deviation (std. dev)² of open interest exhibits a non-linear pattern and differentiated volatility across the three periods analysed, reflecting the depth of the systemic shocks that hit the agricultural markets during the COVID-19 pandemic and the period that followed.

In the Pre-COVID period, the aggregate standard deviation stood at 579,100 contracts (approximately 34.5% of the overall total), outlining a regime of moderate variability consistent with a market characterised by stable liquidity, a predictable hedging-flow structure and the absence of significant systemic frictions.

During the Pandemic Peak, volatility declined slightly to 560,556 contracts (approximately 32.3% of the total), marking a contraction of 3.2% relative to the pre-crisis phase. This reduction—only apparently counterintuitive—can be attributed to the temporary contraction in trading activity resulting from operational restrictions, the reduced mobility of physical goods and the initial precautionary withdrawal of speculative market participants (as documented in the CFTC reports for 2020 and 2021).

In the Post-COVID period, the standard deviation declined further to 524,645 contracts (approximately 30.2% of the total), a fall of 6.5% relative to the Peak period and 9.4% compared with the Pre-COVID period. This dynamic suggests an incomplete normalisation of the markets, marked by a more contained, but not necessarily healthier, volatility. Rather, it reflects a fragile market equilibrium characterised by lower participation volumes, a greater contribution from idiosyncratic and geopolitical shocks and an increasing role of financialization in the transmission of uncertainty [4].

The disaggregated analysis highlights significant heterogeneity across the different markets:

- corn: with an overall average standard deviation of 178,993 contracts, it represents the largest contribution to open interest volatility (32.9% of the total), confirming its role as the primary channel for shock transmission in agricultural derivatives markets;
- soybeans: with 98,848 contracts, they account for 18.2% of aggregate volatility, reflecting the high elasticity of the US soybean market to global logistical shocks;
- wheat (HRW and SRW wheat combined): with a combined standard deviation of 97,044 contracts, it represents approximately 17.8% of total volatility, making it a market particularly sensitive to climatic and geopolitical shocks;
- rice: with only 1,646 contracts, it contributes just 0.3%, highlighting a structurally illiquid market susceptible to asymmetric volatility under conditions of stress [3].

² The standard deviation (std. dev.) quantifies the extent of fluctuations around the mean, but it does not indicate the direction of the relation between two variables. This aspect is instead measured by the correlation coefficient, which will be examined in the subsequent analysis. Accordingly, the standard deviation provides a measure of the market's structural "turbulence", whereas the correlation makes it possible to understand the behavioural dynamic.

These dynamics are consistent with the evidence that the pandemic did not generate explosive volatility, but rather produced “compressed” volatility over the short term, followed by a structural readjustment in the Post-Pandemic period that amplified the divergence between production and financial dynamics.

B) Percentage Change in the Average Open Interest: Pandemic Peak vs Pre-COVID

Table 4 – Percentage Change in the Average Open Interest: Peak Pandemic vs Pre-COVID

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Average	% Change Peak vs. Pre
CORN	1,681,301	1,580,721	1,477,953	1,538,528	-6%
ROUGH RICE	8,271	9,727	9,872	9,592	18%
SOYBEANS	719,000	817,481	753,884	767,559	14%
WHEAT-HRW	299,787	232,189	217,863	234,245	-23%
WHEAT-SRW	421,208	403,221	386,048	396,345	-4%
Average	625,913	608,667	569,124	589,254	-3%*

* The aggregate average percentage change across all commodities. Source: Author’s own elaboration of CFTC data, years 2019–2025.

The analysis of percentage changes in open interest between the Pre-COVID period and the Pandemic Peak phase reveals heterogeneous and asymmetric patterns, shedding light on how health-related and logistical shocks were transmitted to the agricultural derivatives markets.

Corn recorded a contraction of 6%, reflecting a reduction in liquidity linked to the disruptions in global supply chains and an initial withdrawal of commercial hedgers, accompanied by a parallel decline in speculative activity [5].

By contrast, rice recorded an increase of 18%, a substantial figure for a niche market characterised by limited liquidity. This increase is consistent with the intensification of financial and commercial demand observed during the export restrictions adopted by several Asian countries, which rendered the market particularly sensitive to speculative movements [6].

Soybeans underwent a 14% increase, in line with the pressure generated by simultaneous shocks on both the supply side (production delays in Brazil) and the demand side (Asian lockdowns and Chinese strategic stockpiling). This environment encouraged speculative long positions, consistent with the findings documented by Irwin and Sanders [7].

Hard Red Winter wheat (HRW) presented the most marked decline (-23%), attributable to greater exposure to domestic logistical bottlenecks and a more concentrated market structure, whereas Soft Red Winter wheat (SRW) showed a more moderate contraction (-4%), suggesting partial resilience due to greater varietal and geographical diversification.

Overall, the aggregate decline of 3% confirms a transitory contraction in liquidity during the Pandemic Peak phase.

C) Average Net Positions of Market Participants

Market Conditions and Psychological Reaction of Producers/Hedgers

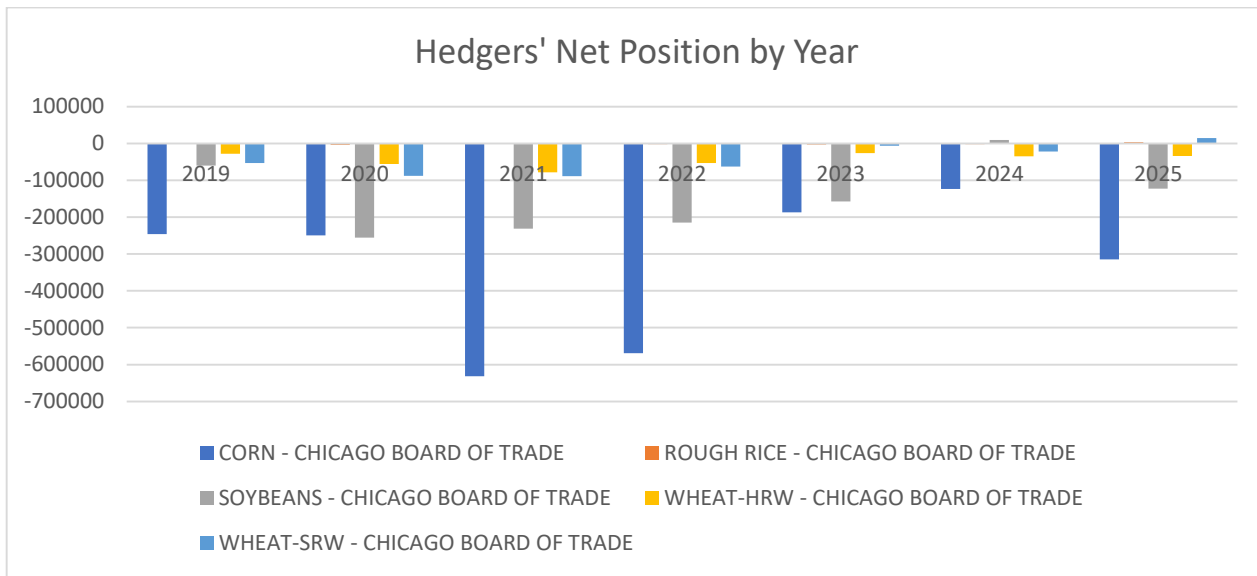
Table 5 – Average Net Positions of Hedgers

AVERAGE NET_HEDGERS	YEAR							
COMMODITY (as Traded on CBoT)	2019	2020	2021	2022	2023	2024	2025	7-year Average

CORN	-245,856	-249,684	-631,465	-568,760	-186,927	-123,606	-314,740	-331,656
ROUGH RICE	303	-3,739	-1,395	-2,241	-3,036	-2,250	3,610	-1,446
SOYBEANS	-60,245	-255,611	-231,183	-214,574	-157,185	9,424	-123,076	-148,020
WHEAT-HRW	-28,256	-56,248	-78,161	-52,834	-26,152	-34,927	-34,161	-44,772
WHEAT-SRW	-53,337	-87,590	-88,699	-62,654	-6,761	-21,760	14,383	-46,031
Overall Average	-77,478	-130,574	-206,181	-180,212	-76,012	-34,624	-90,797	-114,385

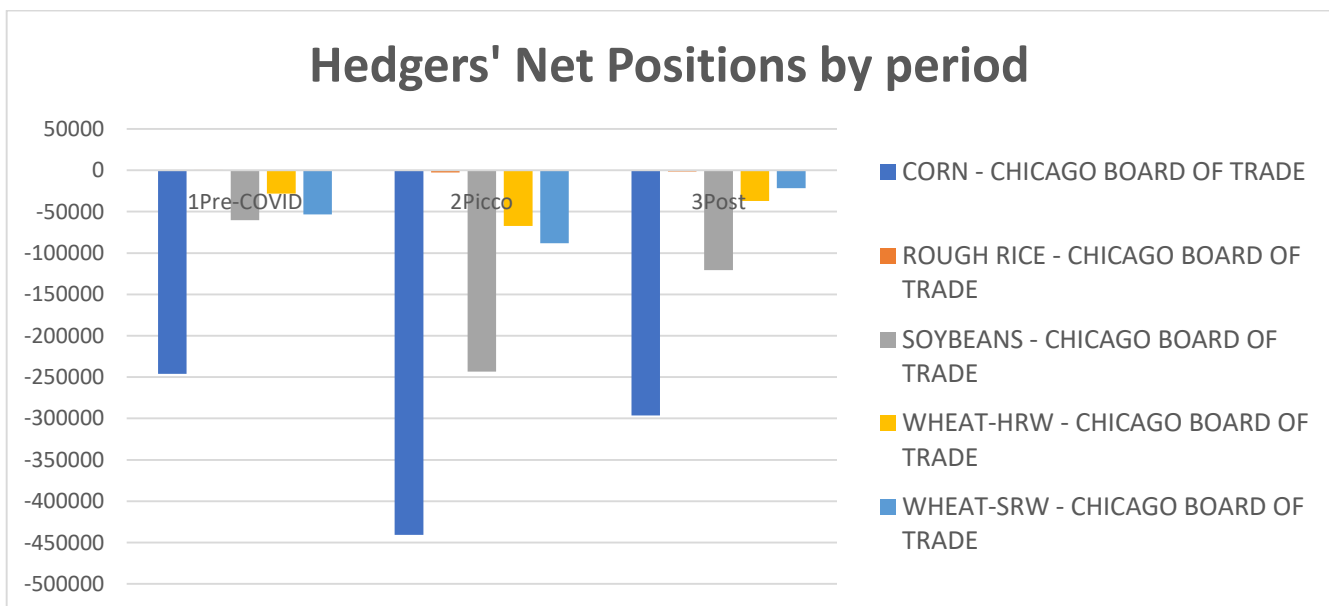
Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 3 – Hedgers' Net Positions by Year



Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 4 – Hedgers' Net Positions by Period



Source: Author's own elaboration of CFTC data, years 2019–2025.

Hedgers' net positions remained persistently negative throughout the 2019–2025 period, confirming the structural predominance of short positions driven by the need to hedge against price risk. Annual averages reveal a marked deterioration during the pandemic: the figure declined from -77,478 contracts in 2019 to a low of -206,181 in 2021 (+58% relative to 2019), before gradually recovering to -34,624 in 2024 (-83% relative to 2021).

At the commodity level, corn accounted for the largest overall exposure (-331,656), followed by soybeans (-148,020), while wheat markets (HRW and SRW wheat) presented more moderate values (-44,772 and -46,031, respectively). Rice remained marginal (-1,446), reflecting the limited depth of the market.

This configuration is consistent with the typical behaviour of commercial operators, who use short positions as their primary risk-management instrument in order to stabilise future revenues. The increase in net short positions in 2021 coincided with the most acute tensions in global supply chains, when logistical disruptions and heightened price uncertainty intensified hedging demand. As highlighted by the Commodity Futures Trading Commission (CFTC, 2021), periods of market stress generate greater hedging pressure, producing temporary effects in the form of liquidity compression and contractions in open interest.

Overall, the dynamics of hedgers' positions during the 2019–2025 period appear fully consistent with the underlying risk conditions faced by the agricultural sector.

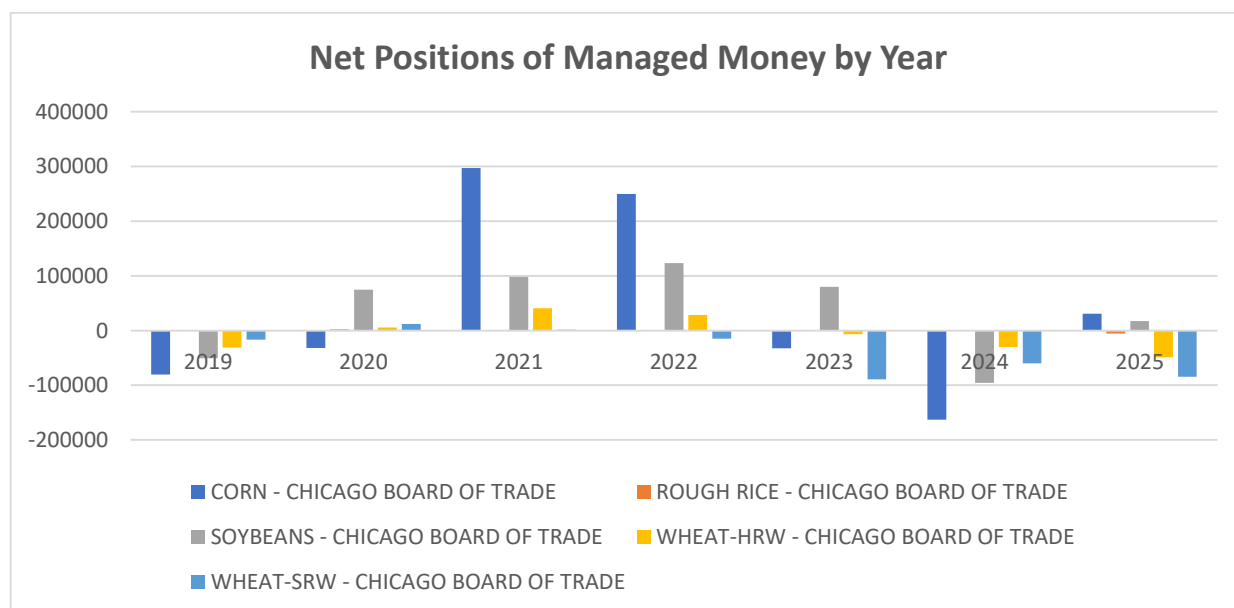
Market Conditions and Psychological Reaction of Speculators/Managed Money

Table 6 – Average Net Positions of Speculators/Managed Money

NET AVERAGE_ MANAGED MONEY	YEAR							
COMMODITY (as Traded on CBoT)	2019	2020	2021	2022	2023	2024	2025	7-year Average (2019–2025)
CORN	-80,596	-32,099	297,044	250,034	-32,165	-163,137	30,716	38,280
ROUGH RICE	-878	2,167	462	656	878	64	-5,273	-75
SOYBEANS	-50,472	74,556	98,396	123,228	80,084	-95,502	17,153	35,702
WHEAT-HRW	-31,124	5,625	40,818	28,243	-6,622	-30,189	-48,909	-4,381
WHEAT-SRW	-16,593	12,286	1,541	-14,612	-89,065	-60,159	-84,502	-34,002
Overall Average	-35,932	12,507	87,652	77,510	-9,378	-69,785	-18,163	7,105

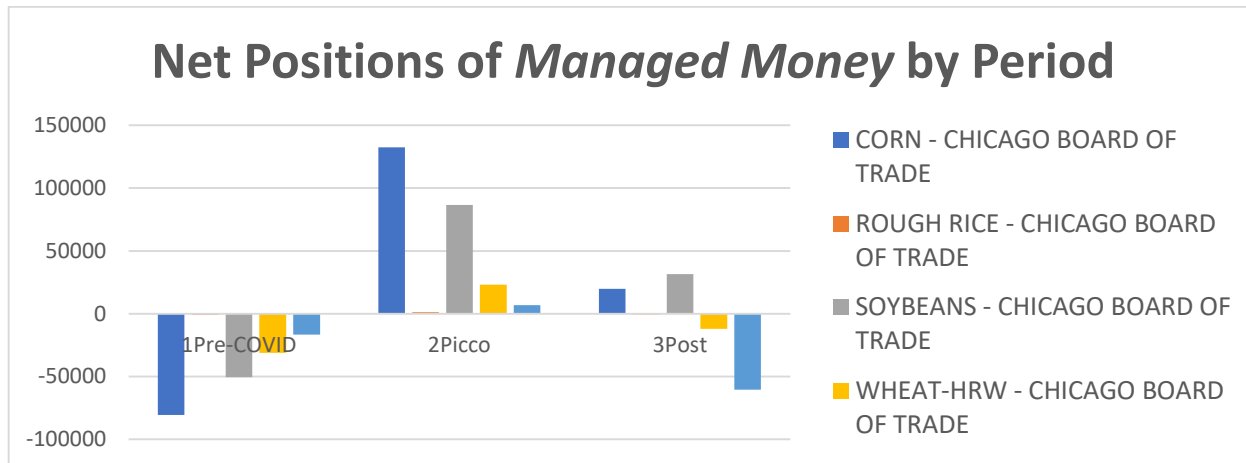
Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 5 – Net Positions of Speculators and Managed Money by Year (2019–2025)



Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 6 – Net Positions of Speculators and Managed Money by Period (Pre-COVID, Peak, Post-COVID)



Source: Author's own elaboration of CFTC data, years 2019–2025.

The data on the net positions of the managed money category reveal considerable variability over the 2019–2025 period, with fluctuations reflecting alternating phases of expansion and contraction in speculative participation in the agricultural markets. Aggregate net positions were negative in 2019 (-5,932), but turned positive in 2020 (+12,507) and reached a maximum in 2021 (+87,652), corresponding to an increase of 344% relative to 2019, before returning to negative values in the following three years (-9,378 in 2023, -69,785 in 2024 and -18,163 in 2025). Nevertheless, the cumulative balance for the overall period remained positive (+7,105). At the commodity level, corn represented the dominant component of speculative activity (+38,280), whereas rice recorded a marginally negative average position (-75 contracts), consistent with the limited structural liquidity of this market and its comparatively lower appeal to systematic speculative strategies. The spike in positions observed in 2021 reflects a rise in speculative activity coinciding with the most intense phase of tensions in commodity markets during the pandemic, characterised by global supply-side shocks, including logistical disruptions, input shortages and heightened geopolitical risk. Under such conditions, the participation of non-commercial traders naturally tends to increase in response to higher expected volatility and the expansion of arbitrage opportunities and tactical exposure-management strategies. The subsequent reduction in net positions between 2022 and 2024 is consistent with the easing of pressures on agricultural prices and the gradual return of market fundamentals towards more stable levels. Overall, the dynamics of speculative positions confirm that:

- prolonged unidirectional patterns consistent with hypotheses of “amplifying speculation” of prices are not observed;
- position trends appear to react to market conditions rather than systematically anticipate them;

fluctuations are more pronounced in deep and liquid markets (corn and soybeans), consistent with the role of speculators as liquidity providers in more developed market segments.

- Market Conditions and Psychological Reaction of Intermediaries/Swap Dealers

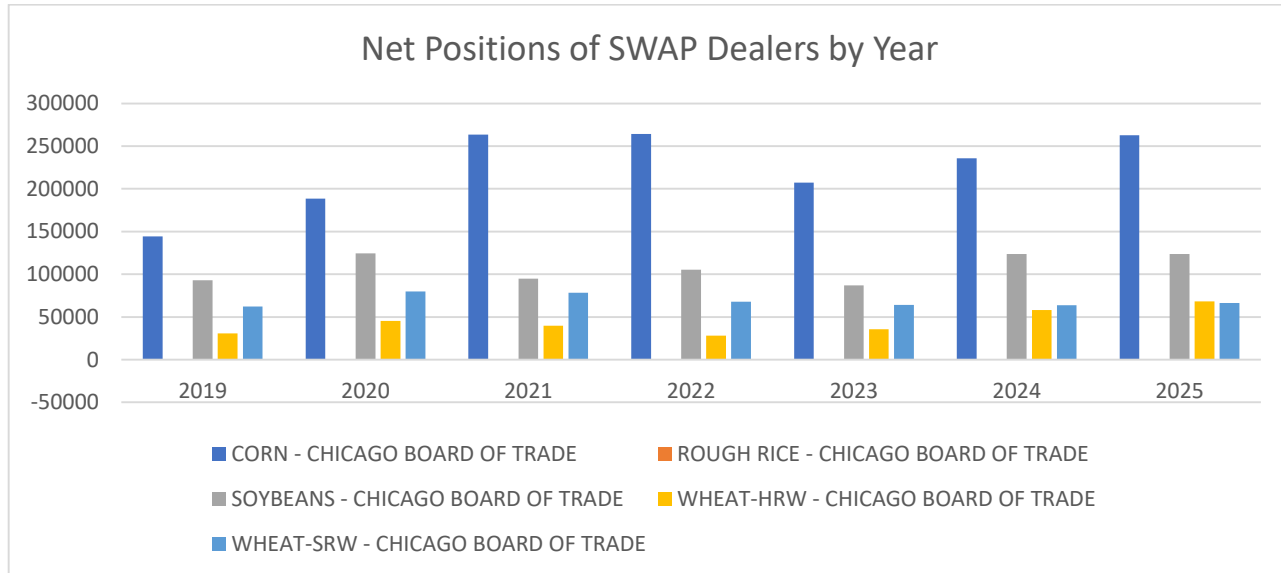
Table 7 – Net Positions of Intermediaries/Swap Dealers by Year

NET AVERAGE_SWAP	YEAR							
COMMODITY (as Traded on CBoT)	2019	2020	2021	2022	2023	2024	2025	7-year Average (2019–2025)
CORN	144,418	188,618	263,400	264,332	207,115	235,892	262,777	222,273
ROUGH RICE	49	113	84	160	49	-8	-104	55

SOYBEANS	92,842	124,381	94,864	105,466	86,966	123,533	123,609	106,779
WHEAT-HRW	30,850	45,467	39,779	28,082	35,587	58,131	68,128	42,785
WHEAT-SRW	62,220	79,680	78,193	67,683	63,909	63,660	66,398	68,902
Overall Average	66,076	87,652	95,264	93,145	78,725	96,242	104,162	88,159

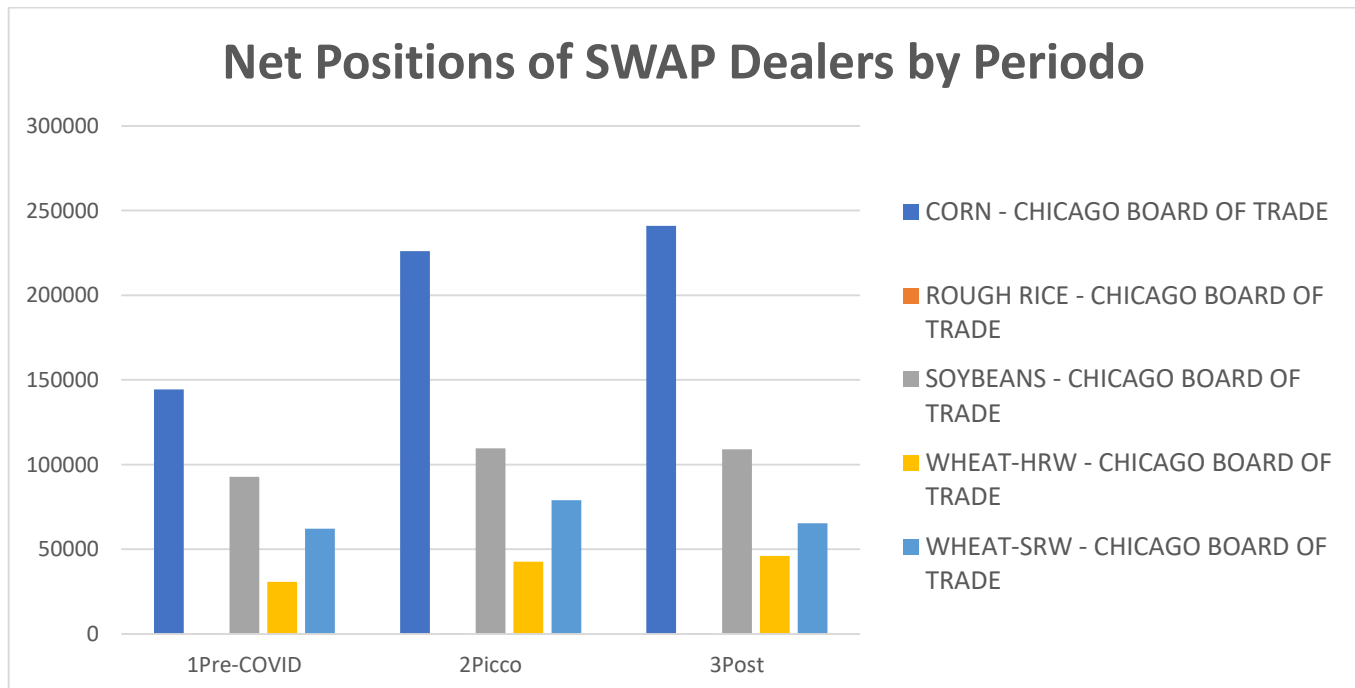
Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 7 – Net Positions of Intermediaries/Swap Dealers by Year (2019–2025)



Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 8 – Net Positions of Intermediaries/Swap Dealers by Period (Pre-COVID, Peak, Post-COVID)



Source: Author's own elaboration of CFTC data, years 2019–2025.

Average net positions held by swap dealers remained consistently positive throughout the 2019–2025 period, ranging from 66,076 contracts in 2019 to 104,162 contracts in 2025, with an overall average equal to 88,159

contracts. Corn represented the dominant component of the total aggregate (222,273 contracts), followed by soybeans and the two wheat markets (HRW and SRW wheat). Overall, positions rose by 57.6% between 2019 and 2025, indicating a significant and progressive increase in the intermediaries' net long positions. From a functional perspective, swap dealers operate as intermediaries between institutional clients (for example, index funds, pension funds and large importers) and the futures market. Their positive net positions typically reflect the structure of over-the-counter (OTC) contracts with clients: when clients take long positions in commodity indices or commodity baskets, swap dealers hedge this exposure by taking equivalent long positions in futures markets, thereby generating a positive net balance in COT reports. This dynamic implies that swap dealers do not express a directional market view; rather, they perform a risk-transfer and risk-management function, transferring to regulated futures markets the exposure originating from client activity. The progressive expansion of net positions after 2021 coincided with:

- The Growth of Agriculture-Related Index Funds;
- Increased Price-Risk Hedging by Commercial Operators Following the Pandemic Crisis;
- Greater Integration Between Otc and Futures Markets.

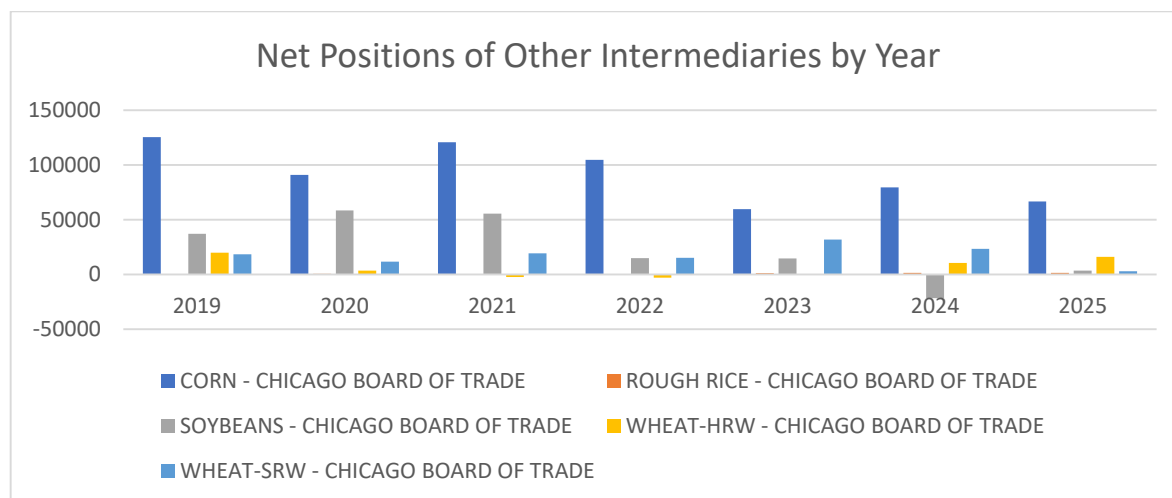
Market Conditions and Psychological Reaction of Other Intermediaries/Index Funds

Table 8 – Average Net Positions of Other Intermediaries/Index Funds by Year

NET AVERAGE_OTHER INTERMEDIARIES	YEAR							
COMMODITY (as Traded on CBoT)	2019	2020	2021	2022	2023	2024	2025	7-year Average (2019–2025)
CORN	125,387	90,832	120,610	104,708	59,437	79,577	66,568	93,441
ROUGH RICE	65	624	60	92	1,136	1,396	1,429	658
SOYBEANS	36,995	58,271	55,376	14,773	14,540	-21,852	3,487	23,738
WHEAT-HRW	19,710	3,558	-2,308	-3,113	-196	10,399	16,086	5,927
WHEAT-SRW	18,388	11,719	19,301	15,199	31,662	23,220	2,854	18,077
Overall Average	40,109	33,001	38,608	26,332	21,316	18,548	18,085	28,368

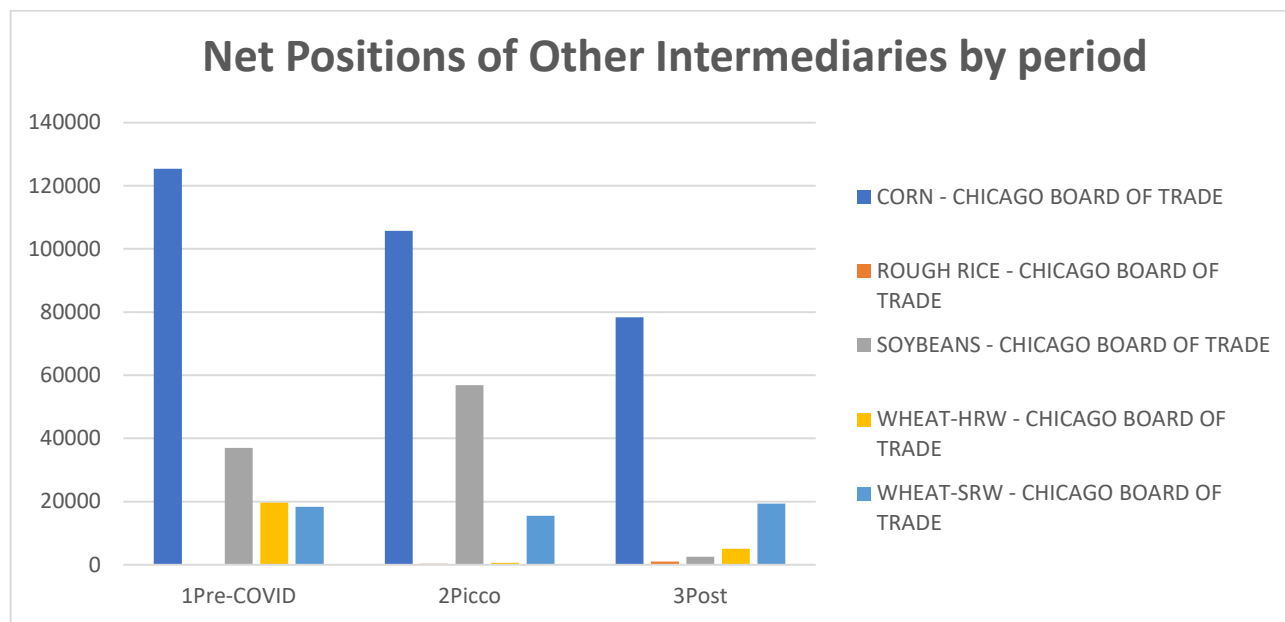
Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 9 – Net Positions of Other Intermediaries/Index Funds by Year (2019–2025)



Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 10 – Net Positions of Other Intermediaries/Index Funds by Period (Pre-COVID, Peak, Post-COVID)



Source: Author's own elaboration of CFTC data, years 2019–2025.

The average net positions of other intermediaries declined significantly between 2019 and 2025, falling from 40,109 to 18,085 contracts (–55%). The contraction became particularly pronounced after 2022, with negative values recorded in the soybean market (–21,852 in 2024), signalling a gradual withdrawal by index funds and index traders replicating passive commodity-index strategies. The largest contribution continued to come from corn, which accounted for the main share of average exposure (93,441), consistent with the weighted structure of the principal commodity indices (GSCI and BCOM).

This evolution reflects the non-discretionary nature of operators within this category, who are typically linked to index-replication strategies involving long-only positioning and mechanical adjustments based on periodic rebalancing criteria. During the 2019–2021 period, the prevalence of positive long positions suggests the effect of replication mechanisms during the broad-based rise in commodity prices following the pandemic. After 2022, the gradual decline in positions aligned with the contraction in global index-fund volumes, driven both by the normalisation of prices and by rising interest rates, which made commodity investments relatively less attractive.

Overall, the category of other intermediaries represents a segment that contributes consistently to market liquidity but does not play an active role in price discovery.

Structural Overview of Market Participant Behaviour

The overall interpretation of the results makes it possible to reconstruct a structural framework of the behaviour of the different categories of market participants by relating their net positions to the underlying economic and psychological logic driving them.

Table 9 – Average Net Positions by Market Participant and Period

MARKET PARTICIPANT	1Pre-COVID	2Peak	3Post	Average
Net_hedgers	-77,478.23	-168,377.46	-95,430.85	-113,762.18
Net_managed money	-35,932.48	50,079.59	-4,338.19	3,269.64
Net_swap dealers	66,075.93	91,457.74	92,288.20	83,273.96
Net_other intermediaries	40,109.05	35,804.33	21,271.47	32,394.95

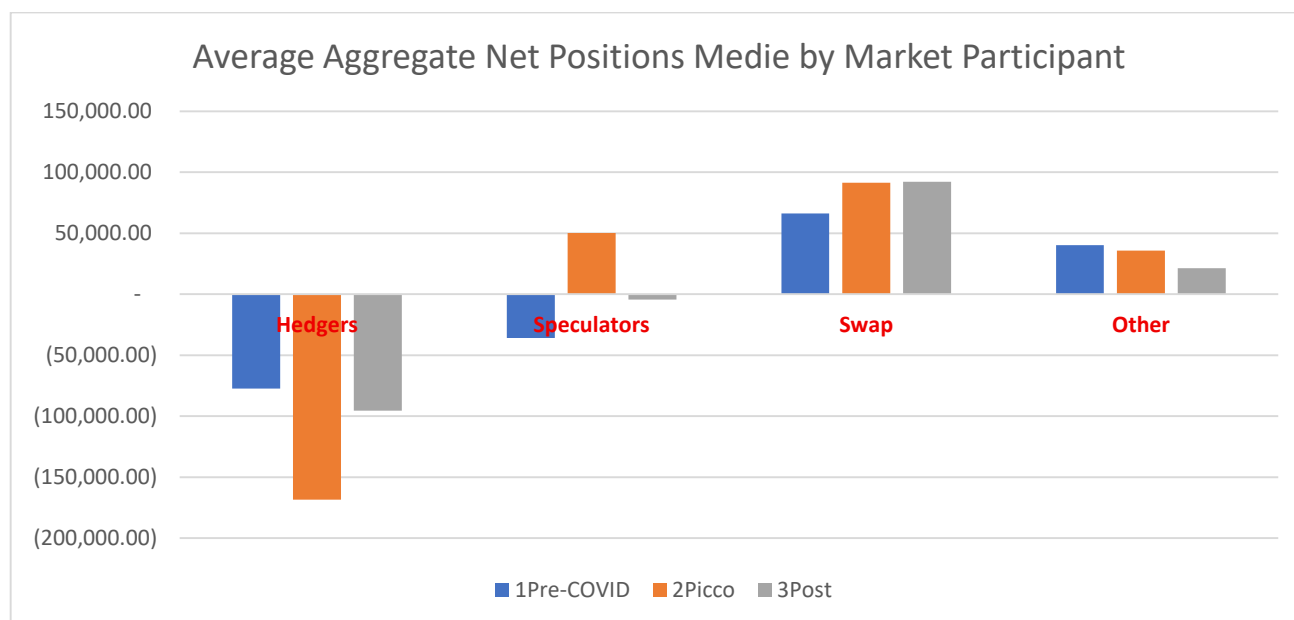
Source: Author's own elaboration of CFTC data, years 2019–2025. Note: Aggregated values

The aggregate analysis of net positions (see Table 9) makes it possible to identify the behaviour of the different COT market participants over the entire 2019–2025 period, providing an overall perspective on how each category responded to the pandemic and post-pandemic shocks. Four clearly differentiated profiles emerge, each reflecting distinct operational and psychological logics.

Slight differences in reported average net positions for hedgers (e.g. –113,762 in Table 9 vs. –114,385 in Table 5) arise from alternative aggregation methods: Table 9 reports period-level means (weighted by the number of weeks in each phase), while Table 5 reports the simple arithmetic mean of the seven annual means. Both approaches are valid and the difference is negligible (<0.6%).

Taken together, the four categories outline a strongly asymmetric market structure: hedgers adopt a defensive stance, speculators respond opportunistically and with high sensitivity to shocks, swap dealers stabilise flows through the transfer of exposure, while index funds operate as passive amplifiers of broader market trends. This integrated interpretation highlights the structural distinction between real and financial-market dynamics, confirming that the pandemic intensified the divergence between hedging behaviour and investment behaviour.

Graph 11 – Average Aggregate Net Positions by Market Participant and Period



Source: Author's own elaboration of CFTC data, years 2019–2025.

D) Average Share of Open Interest Held by Managed Money Speculators

Table 10 – Average Share of Open Interest Held by Managed Money Speculators

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Overall Total	% Change Peak vs Pre
CORN	28%	25%	31%	29%	-10%
ROUGH RICE	32%	28%	33%	32%	-12%
SOYBEANS	28%	20%	25%	24%	-28%
WHEAT-HRW	46%	39%	42%	42%	-15%
WHEAT-SRW	43%	40%	52%	47%	-8%
Overall Total	36%	31%	37%	35%	-14%

Note: The Overall Total row represents the aggregate average across all commodities for each period. The –14% figure reflects the aggregate average percentage change between the Peak and Pre-COVID periods.

Source: Author's own elaboration of CFTC data, years 2019–2025.

The data reveal a pattern of moderate contraction in speculative participation during the Pandemic Peak, followed by a post-crisis reallocation signalling the persistence of financialization in agricultural markets. In the Pre-COVID period, the aggregate share of open interest held by speculative operators stood at 36%, reflecting a relatively stable balance between hedging activity and financially driven positioning. During the Pandemic Peak, this share declined to 31%, corresponding to a contraction of 14% relative to the baseline period. This trend is consistent with the temporary compression of speculative liquidity caused by operational restrictions and heightened systemic uncertainty, factors that prompted a withdrawal of managed money flows (CFTC, 2021).

In the Post-Pandemic period, speculative participation rose again to 37%, marking an increase of 19% relative to the Peak phase. This dynamic suggests a non-linear normalisation process in which the recovery of financial liquidity was accompanied by the persistence of indexed investment flows, consistent with long-term evidence on the financialization of agricultural markets [4].

Table 11 – Average Percentage Share of Open Interest Attributed to Speculators

COMMODITY (as Traded on CBoT)	2019	2020	2021	2022	2023	2024	2025	7-year Average (2019–2025)
CORN	28%	28%	23%	24%	32%	37%	30%	29%
ROUGH RICE	32%	32%	25%	25%	29%	32%	51%	32%
SOYBEANS	28%	21%	19%	22%	23%	29%	26%	24%
WHEAT-HRW	46%	38%	41%	32%	42%	47%	47%	42%
WHEAT-SRW	43%	40%	40%	46%	56%	52%	56%	47%
Overall Total	36%	32%	29%	30%	36%	40%	42%	35%

Source: Author’s own elaboration of CFTC data, years 2019–2025.

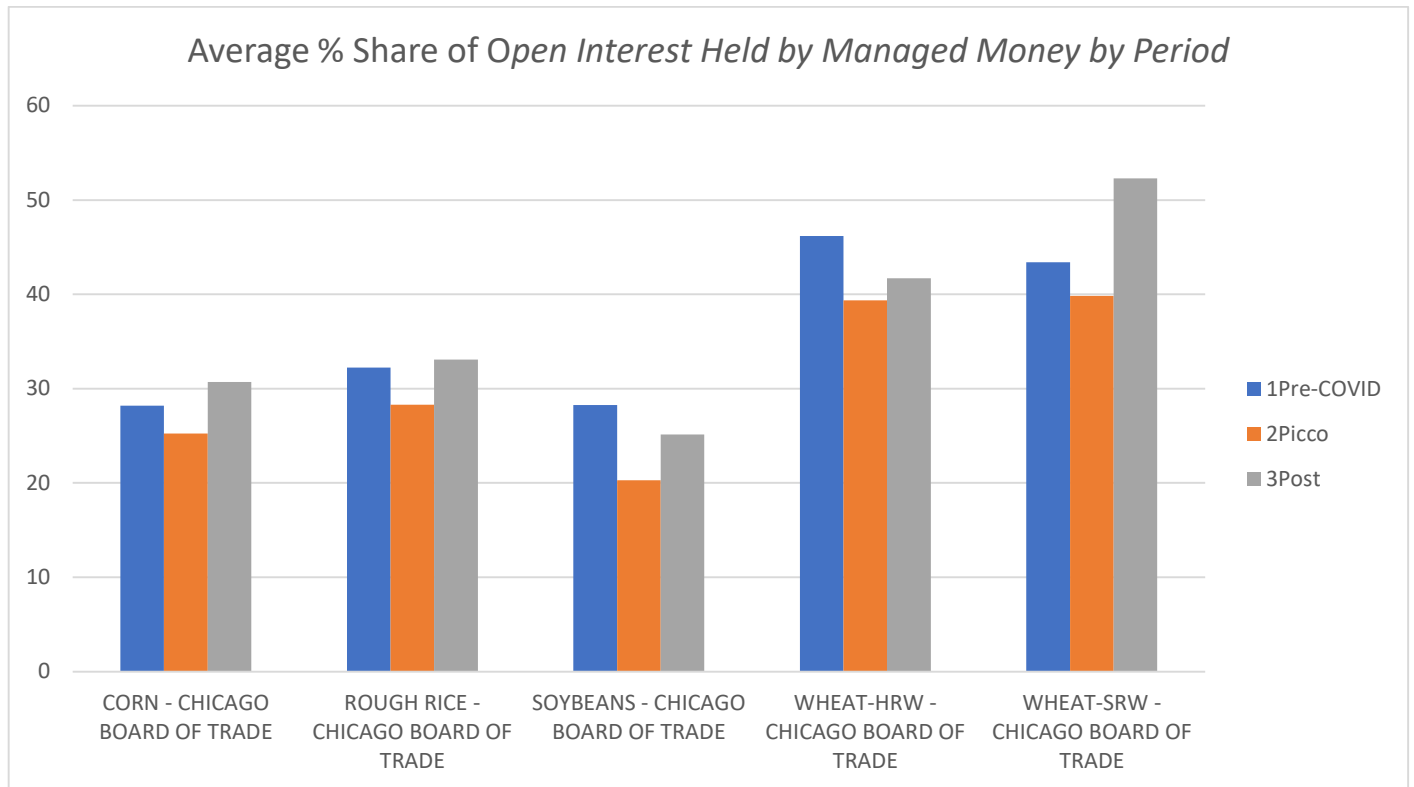
The disaggregated analysis highlights significant differences across the various commodities. Corn and soybeans remain the two markets with the highest concentration of speculative activity, accounting on average for 29% and 24%, respectively, of speculative open interest within their corresponding series, confirming their role as benchmark markets within the row-crop sector. Rice displayed lower levels of speculative participation (32%), consistent with its nature as a niche and structurally less liquid market [3].

The analysis of percentage variations revealed asymmetric patterns in the transmission of pandemic-related shocks:

- Corn: -10% This contraction can be interpreted as the result of disruptions to logistics and the temporary withdrawal of managed money [5].
- Rice: -12% This decline highlights the fragility of thin markets, further compressed by Asian export restrictions [6].
- Soybeans: -28% The sharpest reduction, consistent with simultaneous shocks affecting Brazil (on the supply side) and China (on the demand side), which prompted an initial speculative retreat [7].
- HRW wheat: -15% This effect may be attributed to greater exposure to logistical bottlenecks in the US Midwest.
- SRW wheat: -8% A more limited contraction, indicative of greater structural resilience.

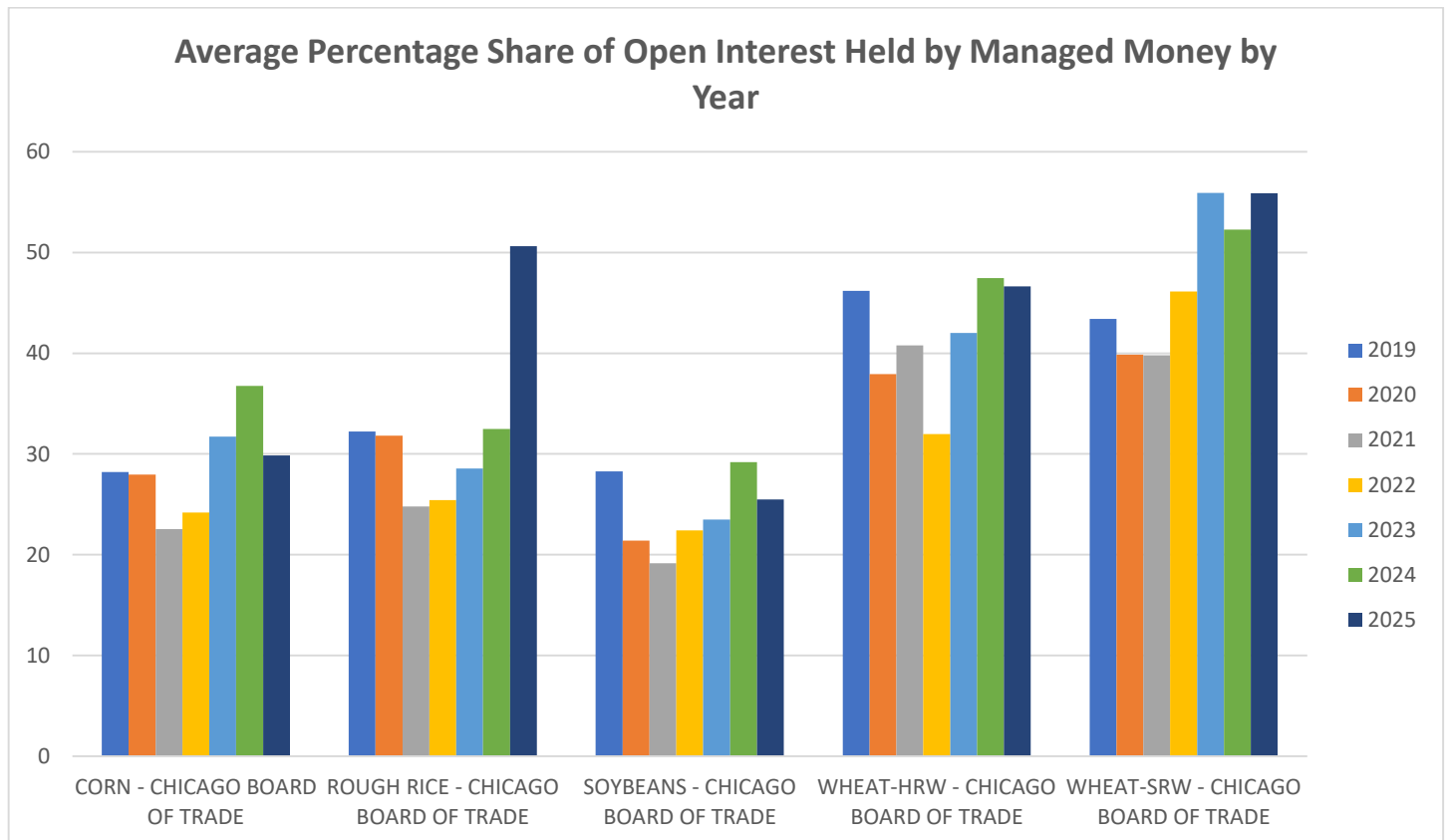
The overall trend (-14%) points to a temporary but significant contraction in the speculative component during the acute phase of the pandemic, generating liquidity-compression effects that widened the divergence between real dynamics (a reduction in physical production) and financial-market dynamics (the withdrawal of speculative flows).

Graph 12 – Average Percentage Share of Open Interest Held by Managed Money by Period



Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 13 – Average Percentage Share of Open Interest Held by Managed Money by Year



Source: Author's own elaboration of CFTC data, years 2019–2025.

E) Volatility by Market Participant Calculated on Net Positions

Volatility of Producers'/Hedgers' Net Positions

Table 12 – Volatility of Hedgers' Net Positions

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Total Std. Dev.
CORN	140,786	263,131	238,554	245,187
ROUGH RICE	1,957	1,642	3,321	2,881
SOYBEANS	67,940	91,789	101,560	114,617
WHEAT-HRW	14,232	23,427	16,085	23,587
WHEAT-SRW	24,852	14,873	33,548	40,569
Overall total	112,000	200,975	159,455	170,847

Source: Author's own elaboration of CFTC data, years 2019–2025.

Analysis of the volatility of hedgers' net positions, measured in terms of the weekly standard deviation, reveals a profile that is both clearly cyclical and sensitive to shocks caused by the pandemic. The data reported in Table 12 show an aggregate standard deviation of 112,000 contracts during the Pre-COVID period, reflecting a context of relative stability in commercial hedging strategies, consistent with normal operating conditions and well-functioning supply chains.

During the Pandemic Peak period, volatility increased significantly, up to 200,975 contracts, corresponding to a +79% rise relative to the previous period. This increase is consistent with the intensification of systemic uncertainty caused by the pandemic—including logistical disruptions, sudden shifts in demand and difficulties in delivery planning—which forced commercial operators to rebalance their hedging positions more frequently [5].

In the Post-Pandemic period, the standard deviation declined to 159,455 contracts (-21% relative to the Peak Period), signalling a partial normalisation of hedging behaviour. Nevertheless, volatility remained above pre-pandemic levels, highlighting the persistence of structural fragility in agricultural derivatives markets, consistent with the continued presence of macro-logistical and geopolitical risks [4].

Differences across commodities are particularly pronounced. Corn and soybeans, with overall standard deviation values of 245,187 and 114,617 contracts, respectively, together account for approximately 47% of aggregate volatility. This confirms their systemic role as the main channels through which market shocks are transmitted, consistent with their central importance in global staple crop markets.

Rice, by contrast, exhibits extremely low levels of volatility (2,881 contracts), consistent with its status as a niche market characterized by lower trading volumes and structurally less exposure to financial activity. The two wheat categories (HRW wheat and SRW wheat) recorded intermediate values of 23,587 and 40,569 contracts, respectively, reflecting moderate yet still significant sensitivity to pandemic-related shocks.

Overall, the evidence suggests that the pandemic generated a phase of volatility that was at first compressed then explosive, followed by only partial normalization. This persistence of elevated volatility in hedging positions points to a structural increase in uncertainty.

Volatility of Speculators'/Managed Money Net Positions

Table 13 – Volatility of Speculators Calculated on Net Positions

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Total Std. Dev.
CORN	145,303	213,173	208,238	213,102
ROUGH RICE	2,130	1,345	2,883	2,574

SOYBEANS	56,080	80,082	96,925	97,116
WHEAT-HRW	15,952	28,219	31,977	34,684
WHEAT-SRW	35,437	20,215	37,227	44,767
Overall Total	76,448	114,678	109,588	110,987

Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of the standard deviation of speculative operators' net positions (managed money) reveals a clearly cyclical pattern that was highly sensitive to the market conditions imposed by the pandemic. The values reported in the table show that the volatility of speculative positions increased significantly from the Pre-COVID period to the Pandemic Peak, before stabilising at slightly lower, yet still elevated, levels during the Post-Pandemic period.

In the Pre-COVID period, the aggregate standard deviation stood at 76,448 contracts, outlining a context characterised by relatively stable speculative activity, consistent with a market not exposed to significant exogenous shocks.

During the Pandemic Peak, volatility increased markedly, reaching 114,678 contracts, corresponding to an increase of approximately +50% relative to the Pre-COVID level. This rise reflects the greater sensitivity of speculative operators to informational shocks and systemic uncertainty associated with supply chain tensions and fluctuations in the spot prices of major agricultural commodities [7]. In the Post-Pandemic period, the standard deviation declined to 109,588 contracts, recording a contraction of approximately -4.4% relative to the Peak, while remaining substantially above Pre-COVID levels. This pattern suggests a partial return to normality, accompanied by persistently elevated speculative positioning, indicative of a process of financialization that has not been reabsorbed but rather stabilised at a new structural threshold.

At the commodity level, the main contribution to overall volatility derives from corn (overall standard deviation: 213,102) and soybeans (97,116), which together represent the two segments most sensitive to pandemic-related shocks and the most reactive to managed money trading strategies. The next biggest contributions came from HRW and SRW wheat contracts, whose overall volatility (34,684 and 44,767, respectively) nevertheless indicates substantial exposure to global shocks. Rice, by contrast, with substantially lower overall values (2,574 contracts), once again confirms its status as a low-liquidity market that is comparatively less attractive to systematic speculative strategies.

Overall, the findings suggest that the volatility of speculative positions not only increased during the acute phase of the pandemic, but also remained elevated in the subsequent period. This indicates that pandemic-related shocks produced a persistent change in the behaviour of speculative operators, contributing to the continued sensitivity of agricultural markets to financial impulses. This pattern suggests a cyclical dynamic between phases of overconfidence during periods of market expansion and subsequent retrenchment driven by regret aversion, consistent with the behavioural framework developed by Shiller [8].

Volatility of Intermediaries'/Swap Dealers' Net Positions

Table 14 – Volatility of Intermediaries Calculated on Net Positions

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Total Std. Dev.
CORN	15,765	45,473	37,365	50,195
ROUGH RICE	124	50	148	126
SOYBEANS	15,799	25,874	21,888	23,085
WHEAT-HRW	6,121	5,414	16,433	13,816
WHEAT-SRW	5,300	10,829	7,752	10,750
Overall Total	51,132	80,300	84,867	79,866

Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of the standard deviation of swap dealers' net positions—a category comprising banking and institutional intermediaries acting as counterparties in commodity-linked swap contracts—makes it possible to assess the intensity of the operational fluctuations of these operators across the different phases of the 2019–2025 period. The results reported in the table reveal a clear upward trend from the pre-pandemic period through the subsequent phases, indicating a progressive increase in dealers' exposure to fluctuations in agricultural markets.

In the Pre-COVID period, the aggregate standard deviation stood at 51,132 contracts, a level suggesting relatively limited volatility consistent with a stable market environment characterised by predictable hedging needs and an open interest structure balanced between commercial and financial operators. The Pandemic Peak phase shows a significant increase in volatility, with an aggregate value of 80,300 contracts, corresponding to an increase of approximately +57% relative to the previous period. This expansion reflects the tensions arising from disruptions to global logistics and the increased demand for hedging instruments from institutional clients amid heightened uncertainty regarding agricultural commodity prices [5].

In the Post-Pandemic period, the standard deviation reached its highest value at 84,867 contracts, representing a further increase of +5.7% relative to the Pandemic Peak period. This trend indicates the persistence of structural volatility even after the normalisation of the public health emergency, likely associated with the geopolitical and macroeconomic risks that have characterised global commodity markets since 2022 onwards. The overall average for the entire period analysed is 79,866 contracts, highlighting a level of volatility significantly higher than that observed during the pre-pandemic phase.

At the commodity level, corn recorded the highest standard deviation (50,195 contracts overall), confirming its status as the commodity most sensitive to the balancing requirements of swap dealers, given its central role in hedging portfolios and the depth of its futures market. Values for soybeans were lower but still significant (23,085), while the two wheat categories (HRW wheat and SRW wheat) exhibited more moderate but increasing volatility during the Post-Pandemic period (16,433 and 7,752 respectively). Rice continued to be characterised by consistently very low values across all periods, in line with the market's limited liquidity and the relatively small presence of intermediaries (overall total: 126).

Overall, the observed trajectory suggests that swap dealers played an increasingly important role in balancing client exposures during and after the pandemic, accompanied by a persistent increase in the volatility of their net positions. This implies that, although they are not speculative operators in the strict sense, financial intermediaries became more deeply involved in systemic market fluctuations.

Volatility of Other Intermediaries'/Index Funds' Net Positions

Table 15 – Volatility of Intermediaries Calculated on Net Positions

COMMODITY (as Traded on CBoT)	Pre-COVID	Peak	Post	Total Std. Dev.
CORN	28,435	50,488	32,586	42,183
ROUGH RICE	532	562	709	744
SOYBEANS	18,313	27,444	27,668	36,002
WHEAT-HRW	4,051	4,634	8,758	9,392
WHEAT-SRW	10,226	9,284	13,565	12,062
Overall Total	47,025	48,243	35,700	42,282

Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of the standard deviation of the net positions held by operators classified as other intermediaries/index funds reveals an overall volatility profile characterised by relatively low levels of variability and only modest fluctuations across the three periods considered. In the Pre-COVID period, the aggregate standard deviation amounted to 47,025 contracts, indicating a relatively stable dynamic consistent with the structural and passive nature of this category of market participants.

During the Pandemic Peak, volatility recorded only a marginal increase, reaching 48,243 contracts, equivalent to a +2.6% rise relative to the previous period. This limited increase reflects the largely mechanical response of index funds to changing market conditions, as their trading activity—essentially driven by indexation formulas—tends to moderately amplify variability in the presence of more pronounced price movements.

In the Post-Pandemic period, the standard deviation declined to 35,700 contracts, representing a contraction of 26% relative to the Peak period. This trend may be interpreted as a gradual reabsorption of the tensions accumulated during the phase of maximum uncertainty, with volatility returning to levels more consistent with the historical behaviour of index funds.

From the sectoral perspective, volatility is heavily concentrated in corn markets, which alone account for 42,183 contracts of the overall total of 42,282, confirming the dominant weight of this commodity within indexed portfolios and its role as a benchmark in agricultural markets. Soybeans also display a significant contribution (36,002 contracts), whereas rice maintains extremely low levels (744 contracts overall), consistent with its structurally lower liquidity.

Overall, the volatility profile of other intermediaries/index funds highlights the structural stability typically associated with non-discretionary operators, with only a limited increase during the pandemic followed by subsequent normalisation.

F) Analysis of the Correlations Between Operators' Net Positions and Overall Open Interest

Correlation Between Open Interest and Producers'/Hedgers' Net Positions

Table 16 – Correlation Between Open Interest and Hedgers' Net Positions by Commodity

COMMODITY (as Traded on CBoT)	1Pre-COVID	2Peak	3Post
CORN	-0.20	-0.86	-0.69
ROUGH RICE	-0.54	-0.95	-0.66
SOYBEANS	-0.09	-0.95	-0.64
WHEAT-HRW	0.52	-0.79	-0.68
WHEAT-SRW	0.69	-0.79	-0.68

Source: Author's own elaboration of CFTC data, years 2019–2025.

The correlation values reported in Table 16 consistently show how commercial operators (hedgers) adjust their net exposure in response to phases of expansion or contraction in overall market participation (open interest). The results reveal a clearly cyclical pattern consistent with the hedging logic typically characterising physical market operators.

In the Pre-COVID period, correlations were heterogeneous (ranging from –0.20 to +0.69), with an average value close to zero. This suggests a structurally balanced market in which hedgers did not respond systematically to fluctuations in open interest, reflecting a period characterised by the absence of major shocks and by regular, predictable hedging strategies.

During the Pandemic Peak, the situation changed radically. Correlations became strongly negative across all commodities (ranging from -0.79 to -0.95, with an average of -0.87). This pattern reflects behaviour typically observed during periods of market stress: as open interest increased—driven by the accelerated entry of financial operators and heightened systemic volatility—hedgers reduced their net exposure or increased their short hedging positions. In other words, they reacted defensively by reducing operational risk in the presence of extremely uncertain market conditions, characterised by disrupted supply chains and severe logistical instability.

In the Post-COVID period, correlations remained negative, although with lower intensity (ranging from -0.64 to -0.69, with an average of -0.67). This indicates the persistence of precautionary behaviour, albeit within a context

of gradual normalisation. Hedgers continued to move counter to overall market flows, suggesting that the effects of the pandemic crisis had not entirely disappeared and that agricultural markets remained exposed to residual risks—including shocks in the energy markets, geopolitical tensions and elevated input costs.

Overall, the predominance of negative correlations (with an overall average of approximately -0.49) confirms the stabilising function of hedgers: they increase hedging activity when overall market participation expands and reduce it during phases of contraction. This behaviour is consistent with the economic theory of risk transfer and with the empirical evidence provided by conditional volatility models in the literature, according to which hedging strategies are typically pro-cyclical with respect to market fundamentals, but counter-cyclical relative to financial speculation.

Correlation Between Open Interest and Speculators'/Managed Money Net Positions

Table 17 – Correlation Between Open Interest and Speculators' Net Positions by Commodity

COMMODITY (as Traded on CBoT)	1Pre-COVID	2Peak	3Post
CORN	0.18	0.53	0.18
ROUGH RICE	0.47	0.87	-0.01
SOYBEANS	-0.20	0.82	0.04
WHEAT-HRW	-0.72	0.22	0.18
WHEAT-SRW	-0.79	0.22	0.18

Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of the correlations between speculators' net positions (Net Speculators) and total open interest makes allows us to examine the extent to which speculative activity moves in line with the expansion or contraction of the futures market. The results obtained for the five commodities considered—corn, rice, soybeans, HRW wheat and SRW wheat—reveal a markedly heterogeneous pattern across the three periods analysed (Pre-COVID, Pandemic Peak and Post-Pandemic), with important implications for understanding the role of speculation in agricultural markets.

In the Pre-COVID period, the correlation coefficients ranged from -0.79 (SRW wheat) to 0.47 (rice), with an average of -0.15. This configuration, characterised by a predominance of negative correlations, suggests that prior to the pandemic speculators generally adopted positions that moved counter to changes in overall open interest, thereby potentially exerting a stabilising influence in certain cases.

During the Pandemic Peak, the situation changed radically: all correlations became positive, ranging from 0.22 to 0.87, with an average value of 0.51. This marked shift suggests that during the phase of greatest uncertainty—characterised by a rapid increase in activity within futures markets—speculators moved in line with open interest, increasing their positions in parallel with market growth. Such behaviour reflects a more intense speculative involvement, likely driven by expectations of rising prices and by the perception of opportunities associated with pandemic-related disruptions to supply and logistics.

In the Post-Pandemic period, correlations declined substantially, stabilising at weakly positive values ranging from -0.01 (rice) to 0.18 (corn and wheat), with an average equal to 0.11. This phase, characterised by a partial reabsorption of volatility, reveals a return to more moderate dynamics: speculators maintained a generally pro-cyclical orientation, but with far lower intensity than during the pandemic period.

Overall, the evidence highlights a strongly pro-cyclical speculative behaviour during the health crisis, followed by a process of normalisation in the Post-COVID phase. The sharp increase in correlations during 2020 and 2021—particularly for rice (0.87) and soybeans (0.82)—provides empirical evidence of the opportunistic nature of speculation under conditions of systemic stress, when heightened macroeconomic uncertainty and supply chain tensions encourage more aggressive positioning strategies. By contrast, the negative correlations observed

in the Pre-COVID phase suggest that under ordinary market conditions speculators may behave counter-cyclically, contributing to market liquidity without amplifying market dynamics.

These findings are consistent with the evidence documented in the neoclassical literature—particularly Brunetti and Büyükaşahin [10], Stoll and Whaley [11] and Kim [12]—according to which speculative activity tends to be stabilising or neutral under normal market conditions, while becoming more responsive to market dynamics during periods of stress, without constituting an independent source of price volatility.

Correlation Between Intermediaries’/Swap Dealers’ Net Positions and Open Interest

Table 18 – Correlation Between Open Interest and Swap Dealers’ Net Positions by Commodity

COMMODITY (as Traded on CBoT)	1Pre-COVID	2Peak	3Post
CORN	-0.19	0.91	0.80
ROUGH RICE	-0.46	0.88	0.78
SOYBEANS	0.56	0.89	0.77
WHEAT-HRW	-0.06	0.87	0.77
WHEAT-SRW	0.10	0.87	0.77

Source: Author’s own elaboration of CFTC data, years 2019–2025.

The analysis of the correlations between swap dealers’ net positions and overall open interest reveals a behavioural pattern closely linked to their role as financial intermediaries providing hedging services to commercial and institutional clients. The reported values display a systematic evolution across the three periods analysed (Pre-COVID, Pandemic Peak and Post-COVID), confirming that swap dealers tend to adopt compensatory positions in response to changes in aggregate market exposure.

In the Pre-COVID period, correlations were heterogeneous, ranging from -0.46 (rice) to +0.56 (soybeans), with an average value of 0.18. This variability suggests a relatively neutral dynamic, in which swap dealers responded to clients’ hedging needs without displaying a consistent directional relationship with fluctuations in open interest. Negative correlations (observed for rice and HRW wheat) indicate contexts in which increases in open interest were driven primarily by commercial operators, while swap dealers acted mainly as counterparties.

During the Pandemic Peak, the picture changed radically: correlations became highly positive and homogeneous across all commodities (ranging from 0.87 for wheat to 0.91 for corn, with an average of 0.88). This behaviour signals a systematic intervention by swap dealers in response to the exogenous shocks of 2020–2021, when volatility, perceived risk and demand for hedging services from producers, processors and institutional investors increased significantly. The strong positive correlations imply that, as overall market open interest grew, swap dealers increased their net positions accordingly, thereby acting as financial “shock absorbers” under conditions of market stress.

In the Post-COVID period, correlations remained consistently positive, although less intense than during the Peak period (ranging from 0.77 for soybeans to 0.80 for wheat, with an average value of 0.78). This indicates the persistence of precautionary behaviour and sustained demand for hedging services, albeit within a context of gradual market normalisation. The decline relative to the Pandemic Peak values suggests a progressive recalibration of exposures, consistent with a market environment characterised by geopolitical and climatic uncertainties, but no longer dominated by the immediate systemic shock of 2020.

Overall, the correlation structure indicates that swap dealers act as market stabilisers, increasing or reducing their positions in a manner consistent with changes in aggregate open interest. Periods of particularly high correlation, especially during the Pandemic Peak, reflect intense risk-management activity, while the persistent positivity of correlations in the Post-COVID phase suggests a continuing role in mitigating volatility and supporting market

liquidity, in line with the literature identifying swap dealers as central intermediaries in the transmission and redistribution of risk within commodity markets.

Correlation Between Open Interest and Other Intermediaries'/Index Funds' Net Positions

Table 19 – Correlation Between Open Interest and Other Financial Operators' Net Positions by Commodity

COMMODITY (as Traded on CBoT)	1Pre-COVID	2Peak	3Post
CORN	0.67	0.89	0.72
ROUGH RICE	-0.07	0.89	0.66
SOYBEANS	0.30	0.89	0.65
WHEAT-HRW	0.61	0.86	0.69
WHEAT-SRW	0.68	0.86	0.69

Source: Author's own elaboration of CFTC data, years 2019–2025.

The results relating to the category Other Intermediaries, which includes index funds and index traders, display a systematically and consistently positive correlation profile between net positions and open interest. This pattern reflects the structural behaviour typically associated with index traders—namely, long-only strategies based on mechanical and non-discretionary rebalancing, which follow the overall market trend rather than attempting to anticipate it. In the pre-pandemic period, the correlations are already moderately positive, ranging from 0.30 (soybeans) to 0.68 (SRW wheat), with an average value of 0.48. This level of correlation suggests that index funds replicate market trends in a stable manner, with inflows proportional to the growth in open interest, consistently with a benchmark-tracking logic.

During the Pandemic Peak, the correlation coefficients reached exceptionally high and homogeneous levels (0.86–0.89 across all commodities), with an average of 0.88. This convergence indicates a form of passive herding behaviour: the increase in open interest—driven by pandemic-related shocks and macro-financial pressures—was automatically mirrored in the index funds through the mechanical rebalancing of their long-only strategies, thereby generating a synchronised expansion of net positions. Such an effect is well-documented in the literature on the financialization of commodity markets: index traders mechanically amplify aggregate market movements (e.g. expansions in open interest) without exerting autonomous directional pressure, that is, without engaging in active speculation on expected price increases or declines [13], p. 95. In the Post-Pandemic period, correlations remained strongly positive, although lower than the exceptional levels observed during the Peak phase. Values ranged from 0.65 to 0.72, with an average of 0.68, indicating a normalisation of indexed behaviour while maintaining strong adherence to overall market flows. This confirms that index funds continued to follow trends in open interest, albeit with dynamics less extreme than those recorded during the pandemic period.

Dynamic Synthesis of the Relationships Between Trader Categories and Market Participation

The integrated analysis of the correlations between net positions and overall open interest provides a dynamic perspective on how each trader category responds to changes in aggregate market participation.

Table 20 – Average Correlations Between Open Interest and Net Positions by Trader Category and Period.

TRADER CATEGORY	Pre-COVID	Peak	Post	Average
Producers/hedgers	0.07	-0.87	-0.67	-0.49
Speculators/managed money	-0.21	0.53	0.11	0.14
Intermediaries/swap dealers	-0.01	0.88	0.78	0.55
Other intermediaries/index funds	0.44	0.88	0.68	0.67

Source: Author's own elaboration of CFTC data, years 2019–2025.

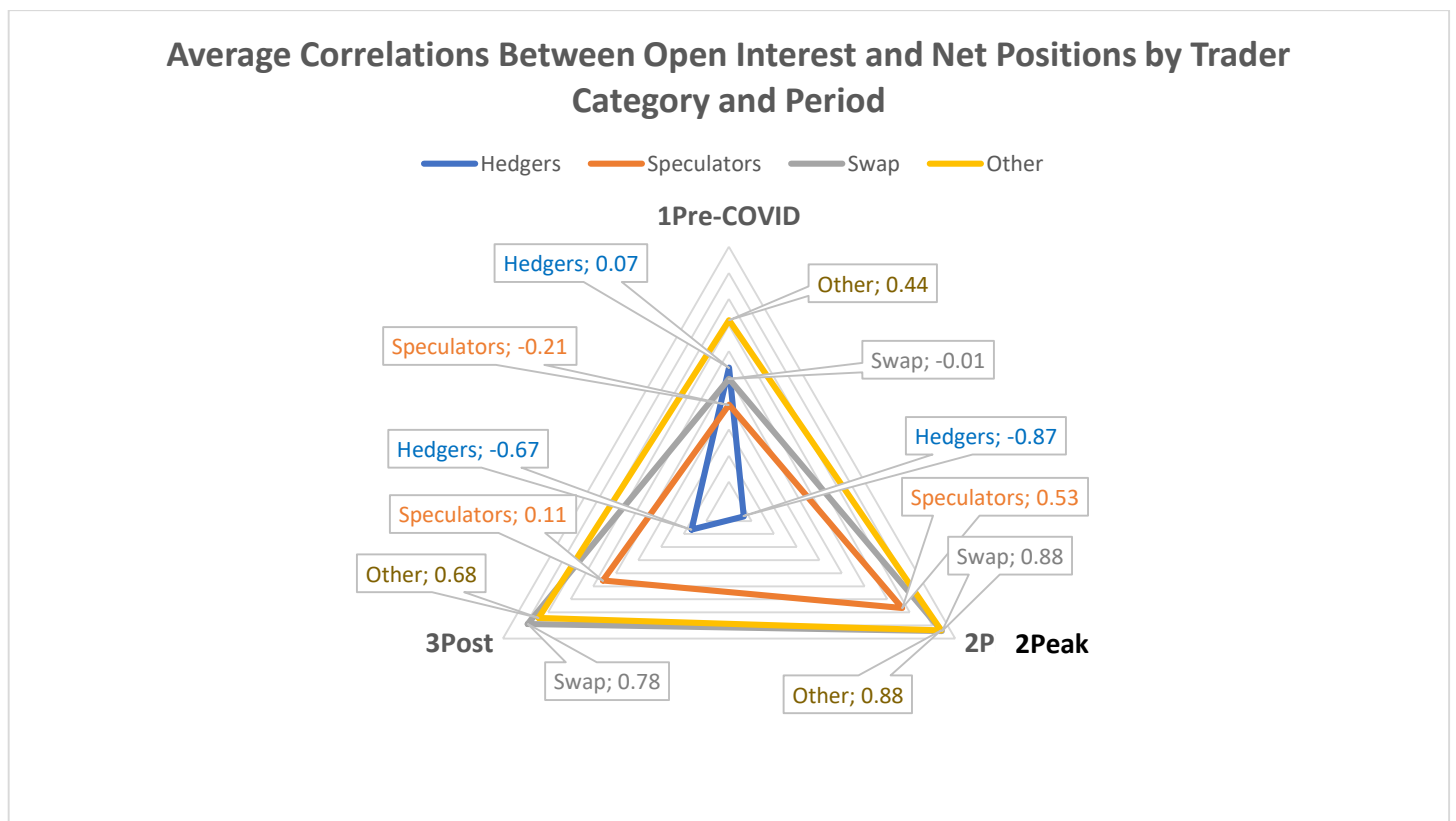
The average correlations between net positions and open interest provide a cross-sectional perspective on the ways in which each trader category responds to expansions or contractions in overall market participation. The resulting structure is clearly segmented.

Overall, the aggregate data reveal a market segmented into four distinct functional roles:

- hedgers → counter-cyclical and stabilising: with an average correlation of -0.49 (peaking at -0.87 during the pandemic), they reduce net exposure as open interest expands, increasing short hedging positions to mitigate operational risk.
- managed money → pro-cyclical under conditions of market stress: weakly positive overall (+0.14) but markedly pro-cyclical during the peak (+0.53), confirming that speculators react to shocks rather than anticipate them, intensifying activity as open interest grows.
- swap dealers → systemic intermediaries: highly positive on average (+0.55, reaching +0.88 at the peak), they expand futures positions to offset OTC client exposure, performing a structural risk-absorption function.
- index funds → passive amplifiers of aggregate market flows: the strongest positive correlation (+0.67, near-perfect at +0.88 during the peak), reflecting mechanical herding through long-only rebalancing that mirrors aggregate market flows.

This configuration confirms the structural divergence between hedging and speculation, a central element in understanding emerging forms of volatility and the increasing interconnection between real-market and financial dynamics in agricultural commodity markets.

Graph 14 – Average Correlations Between Open Interest and Net Positions by Trader Category and Period.



Source: Author's own elaboration of CFTC data, years 2019–2025.

Analysis of the Average Percentage Change in Net Positions by Trader Category in Agricultural Commodity Markets

Average Percentage Change in the Net Positions of Producers/Hedgers

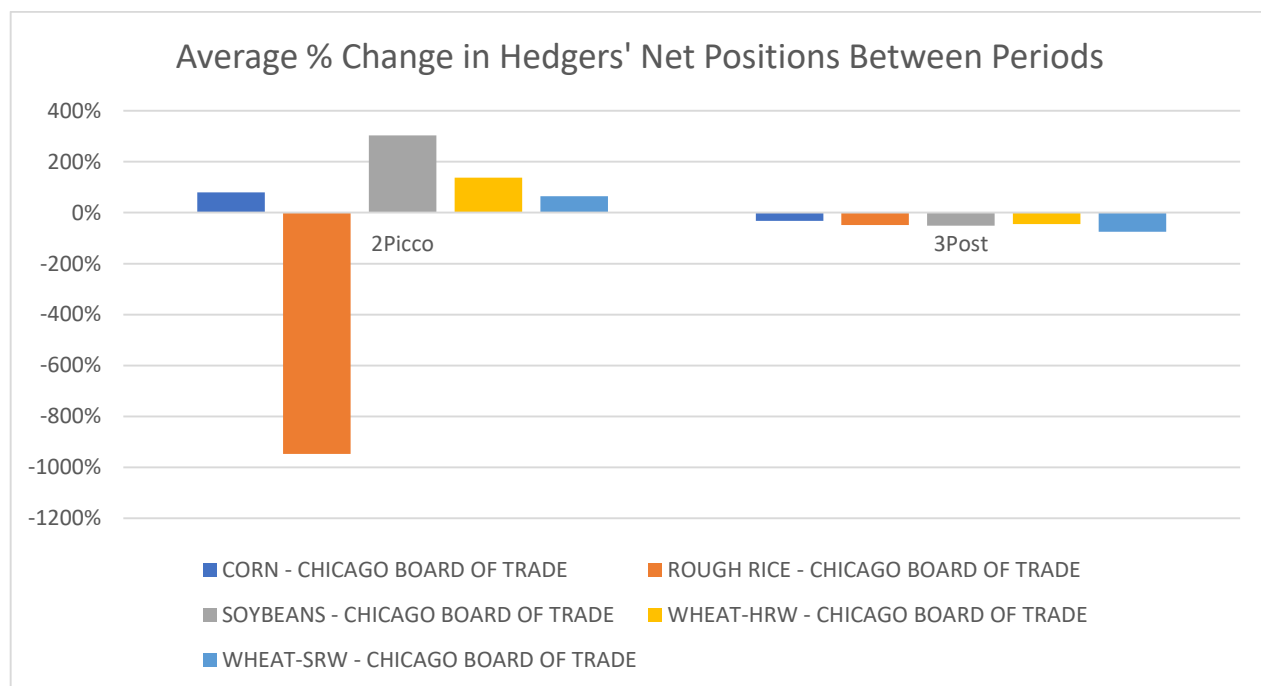
Percentage changes in net positions, particularly for low-liquidity markets such as rough rice, must be interpreted with caution. Because these markets have very small absolute position sizes, even modest shifts in the number of contracts can generate extreme percentage variations. For this reason, the analysis also reports absolute changes and focuses primarily on the five-commodity aggregate and on the two largest markets (corn and soybeans) when drawing general conclusions.

Table 21 – Average Percentage Change in Hedgers' Net Positions

COMMODITY (as Traded on CBoT)	Pre-COVID vs. Peak	Peak vs. Post	Overall Total
CORN	79%	-33%	46%
ROUGH RICE	-948%	-49%	-997%
SOYBEANS	304%	-50%	254%
WHEAT-HRW	138%	-45%	93%
WHEAT-SRW	65%	-75%	-10%
Average	-72%	-50%	-123%

Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 15 – Average Percentage Change in Hedgers' Net Positions



Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of percentage changes in hedgers' net positions highlights a highly heterogeneous and structurally asymmetric dynamic across the three phases considered—Pre-COVID, Pandemic Peak and Post-COVID. This heterogeneity reflects the role of hedgers as market participants primarily engaged in risk management, whose behaviour responds directly to supply shocks and evolving market conditions [4].

The transition from the Pre-COVID period to the Pandemic Peak displays particularly pronounced variations, with fluctuations ranging from -948% in rice to +304% in soybeans, while corn recorded

+79% and the two wheat markets +138% (HRW wheat) and +65% (SRW wheat). The overall average for the category (-72%) points to a substantial intensification of hedging strategies in the presence of global shocks: the pandemic generated widespread disruptions to supply chains and heightened uncertainty, prompting many operators to strengthen the defensive component of their positions. The most extreme contractions occurred in the rice market, where the -948% value reflects a market structure characterised by reduced liquidity and strong sensitivity to trade restrictions, consistent with the observations reported by the FAO [5]. The comparison between the Pandemic Peak and the Post-COVID period reveals only a partial normalisation: the average variation (-50%) indicates that, despite the gradual easing of emergency pressures, hedging strategies did not return to pre-pandemic levels. Hedgers' responses also differed markedly across commodities. In corn, the Peak–Post variation indicates a moderate reduction in net positions (-33%), signalling a gradual withdrawal from the more aggressive hedging strategies adopted during the acute phase of the pandemic. By contrast, soybeans display a cumulative increase of +254% over the full period, indicative of a significant reactivation of hedging strategies in the phases following the Peak, consistent with the greater integration of this market within global agro-industrial supply chains. The cumulative variation across the entire period (-123%) suggests persistent fragility in hedging strategies, in line with the literature documenting how systemic shocks can generate long-lasting effects on risk perception and on the intensity of hedging activity [4]. Within this framework, the evolution of net positions confirms that, during the most acute phase of the pandemic, hedgers performed a predominantly defensive role by increasing the intensity of their hedging activity, while the subsequent phase reveals a slow adjustment towards more stable operating conditions, albeit still far removed from the pre-crisis regime.

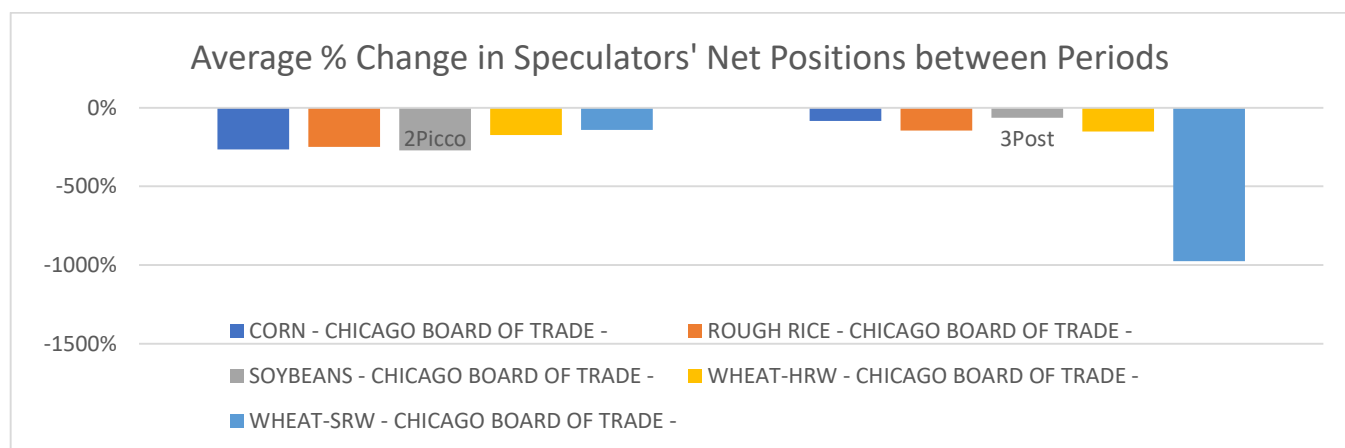
Average Percentage Change in the Net Positions of Speculators/Managed Money

Table 22 – Average Percentage Change in the Net Positions of Speculators/Managed Money

COMMODITY (as Traded on CBoT)	Pre-COVID vs. Peak	Peak vs. Post	Overall Total
CORN	-264%	-85%	-349%
ROUGH RICE	-250%	-146%	-395%
SOYBEANS	-271%	-63%	-335%
WHEAT-HRW	-175%	-152%	-326%
WHEAT-SRW	-142%	-975%	-1116%
Average	-220%	-284%	-504%

Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 16 – Average Percentage Change in the Net Positions of Speculators/Managed Money



Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of the average percentage change in the net positions of speculative traders (*managed money*) reveals a strongly pro-cyclical profile characterised by pronounced fluctuations during the pandemic period. The

data show consistently negative variations both in the transition from Pre-COVID to the Pandemic Peak and from the Peak to the Post-COVID phase, indicating a systematic speculative withdrawal during periods of maximum uncertainty. Speculators' net positions declined on average by -220% between the Pre-COVID period and the Pandemic Peak, with values ranging from -142% for SRW wheat to -271% for soybeans. These dynamics are consistent with the evidence documented by Irwin and Sanders [7], according to which speculators tend to retreat during phases of systemic shock, thereby leaving price formation increasingly driven by market fundamentals. In the case of SRW wheat, the more moderate decline (-142%) reflects greater market resilience, supported by greater liquidity and a more diversified trader base. The transition from the Pandemic Peak to the Post-COVID period further intensified the speculative retrenchment, with an average decline of -284%. However, the reductions were heterogeneous across commodities, ranging from -63% for soybeans to -975% for SRW wheat. The latter, exceptionally large value indicates a drastic downsizing of positions and a possible tactical reversal in managed money strategies, consistent with episodes of geopolitical volatility and abnormal price movements in wheat markets during 2022.

The cumulative variation from Pre-COVID to Post-COVID confirms an average contraction of -504%, reflecting a complete speculative cycle characterised by withdrawal during phases of uncertainty and a subsequent normalisation that nevertheless failed to restore pre-pandemic levels. This pattern is consistent with the literature, according to which speculators tend to respond to volatility rather than generate it [14], [7], adopting an opportunistic behaviour that reduces exposure during periods of shock rather than amplifying them.

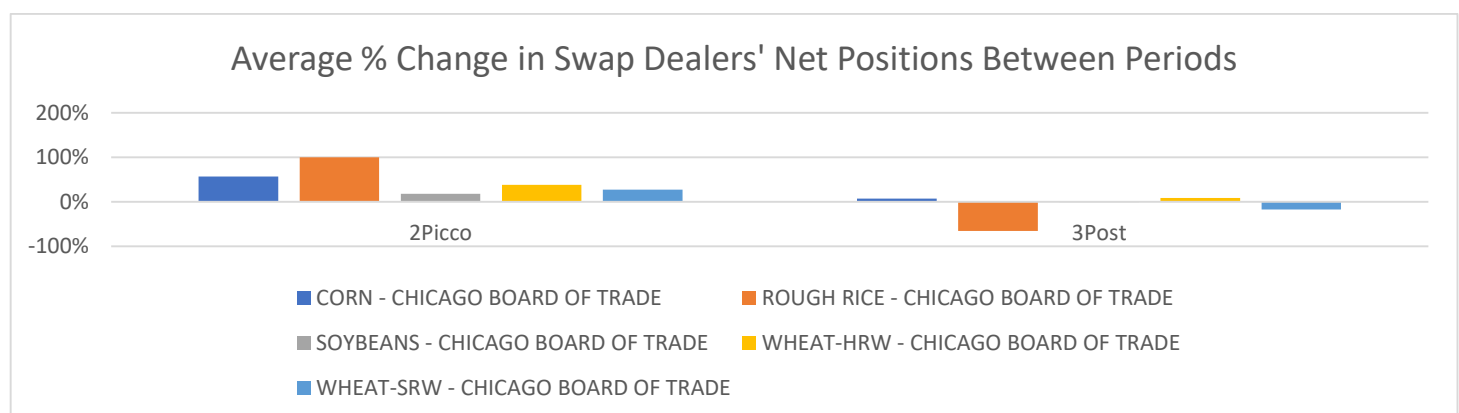
Average Percentage Change in the Net Positions of Intermediaries/Swap Dealers

Table 23 – Average Percentage Change in the Net Positions of Intermediaries/Swap Dealers

COMMODITY (as Traded on CBoT)	Pre-COVID vs. Peak	Peak vs. Post	Overall Total
CORN	56%	7%	63%
ROUGH RICE	100%	-66%	34%
SOYBEANS	18%	-1%	17%
WHEAT-HRW	38%	8%	46%
WHEAT-SRW	27%	-17%	10%
Average	48%	-14%	34%

Source: Author's own elaboration of CFTC data, years 2019–2025

Graph 17 – Average Percentage Change in the Net Positions of Intermediaries/Swap Dealers



Source: Author's own elaboration of CFTC data, years 2019–2025.

The analysis of percentage changes in the net positions of swap dealers reveals a dynamic characterised by significant expansion during the pandemic phase (from Pre-COVID to the Pandemic Peak), followed by a heterogeneous contraction in the subsequent period (from the Peak to Post-COVID). This behaviour is consistent with the structural role of such intermediaries in providing liquidity and facilitating risk transfer between

commercial operators and financial investors [15]. During the transition from the Pre-COVID period to the Pandemic Peak, the data indicate an average aggregate increase of +48%, with marked differences across individual commodities, ranging from +18% for soybeans to +100% for rice. These figures reflect a substantial expansion of swap positions during the Pandemic Peak, suggesting that intermediaries increased their activity in order to absorb the hedging demand generated by systemic uncertainty and disruptions to global supply chains [5]. The simultaneous increase across all five contracts points to a coordinated response by the swap sector to exceptionally turbulent market conditions. In the transition from the Pandemic Peak to the Post-COVID period, the pattern reverses: the overall average variation falls to -14%, indicating a process of position normalisation. Divergent dynamics nevertheless emerge across commodities. While high-volume markets such as corn (+7%) and HRW wheat (+8%) maintained elevated levels of activity, lower-liquidity commodities such as rice experienced sharp contractions (-66%), highlighting greater sensitivity to the withdrawal of financial market participants.

The overall balance reveals a structural expansion in the role of swap dealers, with an aggregate increase of +34% relative to pre-pandemic levels. This trend confirms that financial intermediaries maintained—and in some cases expanded—their presence in agricultural markets, thereby contributing to system resilience through the provision of liquidity and the stabilisation of hedging positions. Taken together, the evidence suggests that swap dealers performed a counter-cyclical role during the pandemic: they expanded during the phase of maximum stress in order to absorb hedging demand and subsequently reduced their exposure, while nevertheless remaining above pre-COVID levels. This behaviour is consistent with their institutional function as systemic intermediaries and with the evidence reported in CFTC [15] reports and FAO analyses of the financial dynamics of agricultural markets.

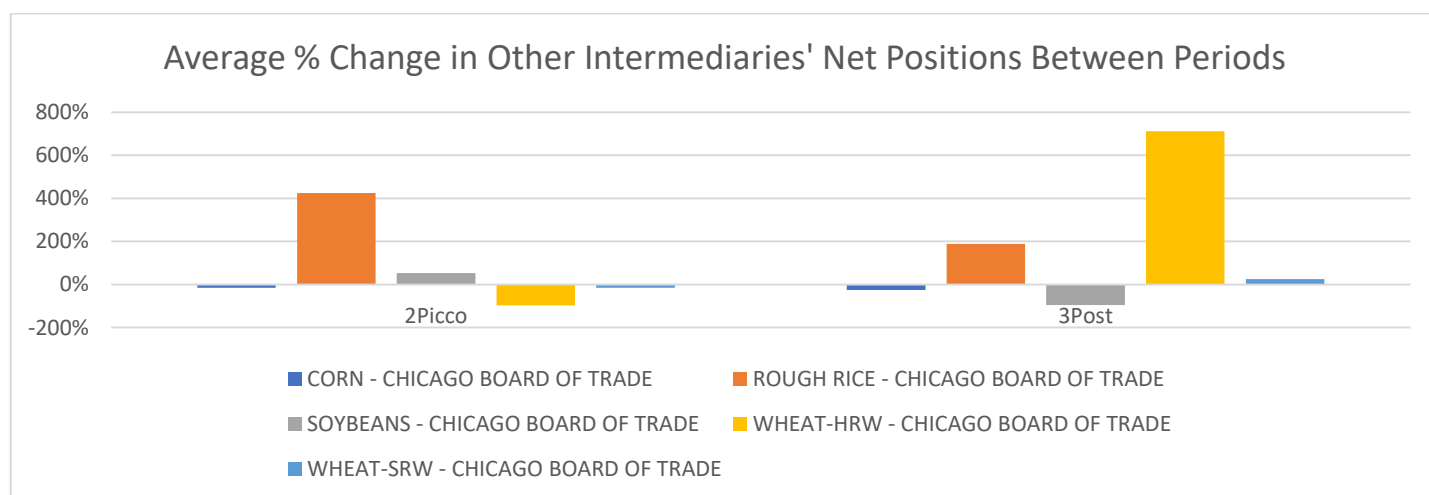
Average Percentage Change in the Net Positions of Other Financial Intermediaries/Index Funds

Table 24 – Average Percentage Change in the Net Positions of Other Intermediaries/Index Funds

COMMODITY (as Traded on CBoT)	Pre-COVID vs. Peak	Peak vs. Post	Overall Total
CORN	-16%	-26%	-42%
ROUGH RICE	426%	188%	614%
SOYBEANS	54%	-96%	-42%
WHEAT-HRW	-97%	713%	616%
WHEAT-SRW	-16%	25%	9%
Average	70%	161%	231%

Source: Author's own elaboration of CFTC data, years 2019–2025.

Graph 18 – Average Percentage Change in the Net Positions of Other Intermediaries/Index Funds



Source: Author's own elaboration of CFTC data, years 2019–2025.

Examination of the average percentage changes in the net positions of other intermediaries/index funds reveals a pattern of pronounced heterogeneity, with particularly large fluctuations both between the Pre-COVID period and the Pandemic Peak and during the Peak–Post transition. This behaviour is consistent with the structurally passive and indexed nature of these market participants, whose flows do not respond to short-term discretionary assessments but are instead largely driven by mechanical rebalancing and systematic investment strategies [7].

In the transition from Pre-COVID to the Pandemic Peak, the average variation of +70% reflects a process of portfolio reallocation concentrated primarily in lower-liquidity commodities. Rice recorded an exceptional increase (+426%), consistent with a niche market exposed to episodes of repricing generated by sudden shifts in demand and sporadic inflows from index funds. An opposite dynamic characterised HRW wheat, which experienced a contraction of 97%, signalling an almost complete withdrawal of non-commercial positions during the phase of greatest uncertainty. The negative variations observed in corn (-16%) and SRW wheat (-16%) point to a downsizing of systematic traders under conditions of market stress, whereas soybeans (+54%) display a selective strengthening of participation, potentially linked to heightened perceived volatility in South American markets.

In the comparison between the Pandemic Peak and the Post-COVID period, the average expansion of +161% indicates a substantial and uneven process of reallocation. The increase in net positions in HRW wheat (+713%) and rice (+188%) suggests a return of indexed flows towards markets characterised by high sensitivity to global shocks. At the same time, the sharp contraction observed in soybeans (-96%) and corn (-26%) points to a selective repositioning towards commodities perceived as less exposed to the macroeconomic risks emerging during the post-pandemic period.

Considering the full time period, the overall average variation of +231% confirms the highly volatile and non-linear role of other intermediaries/index funds category. Whereas hedgers and speculators display patterns more closely aligned with risk-management or return-seeking logics, indexed operators appear characterised by amplified structural dynamism, with potentially significant effects on price formation and the transmission of volatility in agricultural markets—particularly in lower-liquidity commodities, which are more vulnerable to even modest shifts in financial flows. Overall, these findings support the hypothesis that the pandemic generated a significant divergence between protective hedging strategies and the systematic flows of index funds.

DISCUSSION

Systemic Interpretation of Market Dynamics and Implications for Food Insecurity

The analysis of net positions highlights a marked behavioural heterogeneity across the different categories of market participants, reflecting the dual nature (real and financial) of agricultural markets. It should be emphasised that the data analysed refer to the US market, particularly the Chicago Board of Trade (CBoT), the leading exchange for agricultural commodities. Consequently, the commodities most affected by the observed dynamics—above all corn and soybeans, for which the United States is the world's leading producer—were also those most exposed to pandemic-related and other systemic shocks. By contrast, rice, which occupies a relatively niche position within US agricultural production, exhibited lower sensitivity to market volatility, thereby acting in part as a stabilising factor.

Hedgers, consisting primarily of producers and commercial traders, maintained structurally negative net positions (an average of -114,000 contracts, with a peak of -206,000 in 2021), consistent with their risk-hedging function. Short selling positions operate as a form of insurance against potential price declines, enabling operators to stabilise profit margins during a period characterised by a substantial rise in food prices (+28.1% in the FAO Food Price Index (annual average) between 2020 and 2021 [16]). These positions should not, therefore, be interpreted as “losses”, but rather as deliberate trade-offs linked to the loss aversion typically associated with commercial operators [9]. Indeed, these positions contributed to absorbing approximately 47% of overall market volatility, thereby performing a stabilising role during periods of shock.

By contrast, speculators, swap dealers and index funds exhibited considerably more volatile and predominantly positive net positions, reflecting profit-oriented strategies: directional positioning (*managed money*), arbitrage

and balancing activities (swap dealers) and the imitative or mechanical behaviour characteristic of indexed funds (*herding*). This financial component tends to amplify upward price phases and strengthen the correlation between aggregate open interest and prices, particularly in the most liquid commodities. The resulting asymmetry—defensive hedging on the one hand and opportunistic speculation on the other—widens the gap between the real dynamics of agricultural production and the financial dynamics of derivatives markets.

Within this framework, the evidence collected suggests that speculation acted as an amplifying mechanism rather than the primary source of price pressures. The fundamental difference compared with the 2008 food crisis lies in the nature of the shock itself: during the pandemic, price increases were driven primarily by real factors—disruptions to logistics, reductions in production, demand shocks and trade restrictions—which would likely have generated food price inflation even in the absence of increased financial participation. In commodities essential to global food security, such as corn, wheat and rice, supply rigidity and the fragility of supply chains constituted the principal drivers of inflationary pressures. In this context, speculation did not operate as an autonomous destabilising force, but rather as a mechanism that transmitted and amplified economic signals already present within the system.

The implications for food insecurity are significant. Financial volatility, superimposed upon real economic shocks, contributed to increasing the exposure of net food-importing countries, resulting in price increases—even temporary ones such as the +20% in soybeans between 2020 and 2021—that raised the FAO Food Insecurity Index (FIIS) by 10–15% in certain regions of Africa and Asia [17]. From a policy perspective, these findings suggest the need to strengthen transparency and disclosure mechanisms (CFTC) and to promote closer alignment with European regulatory standards (MiFID II), in order to mitigate systemic herding behaviour without undermining the price-discovery function that is essential to the efficient functioning of markets.

Overall, the evidence confirms that the pandemic generated a temporary contraction in speculative activity, followed by a post-crisis reacceleration, within a context in which real economic shocks remained the principal driver of price tensions. The interaction between physical scarcity, financial expectations and structural vulnerabilities therefore defines a new phase in the financialization of agricultural markets, in which market stability can no longer be assessed independently of the real economy.

CONCLUSION

This study examined the evolution of liquidity and speculative positioning in five major agricultural futures contracts traded on the CBOT—corn, soybeans, HRW and SRW wheat, and rough rice—using disaggregated COT data over the 2019–2025 period, segmented into pre-pandemic, pandemic-peak and post-pandemic phases.

The empirical evidence confirms that the pandemic intensified the financialization of agricultural commodity markets without generating destabilising speculative spirals. Cumulative open interest expanded markedly in the post-pandemic phase, while average open interest declined relative to pre-COVID levels, indicating a temporary compression of market liquidity followed by a structurally higher level of financial participation. The four trader categories displayed clearly differentiated functional roles: hedgers maintained persistently negative net positions and counter-cyclical correlations, confirming their stabilising function; managed money exhibited pro-cyclical behaviour concentrated in the acute phase of the crisis, consistent with the view that speculation reacts to shocks rather than generating them; swap dealers acted as systemic intermediaries, expanding their presence to absorb hedging demand; and index funds operated as passive amplifiers of aggregate market flows.

Taken together, these dynamics indicate that real-economy shocks—supply-chain disruptions, logistical bottlenecks and trade restrictions—remained the primary drivers of price tensions, while the financial component amplified rather than originated market movements. Nevertheless, the heightened financial participation increased the exposure of net food-importing countries to price volatility, reinforcing the link between market financialization and food-security vulnerability.

From a policy perspective, the findings underline the importance of strengthening transparency and disclosure mechanisms (CFTC) and of promoting closer alignment with European regulatory standards (MiFID II), in order to contain systemic herding behaviour without undermining the price-discovery and liquidity functions essential

to well-functioning markets. Ultimately, the evidence suggests that the key challenge for policymakers is not to limit financial participation per se, but to ensure that financial markets continue to support risk transfer and price discovery without amplifying vulnerabilities in global food systems.

Several limitations should be acknowledged: the study is confined to US CBOT futures (excluding options and non-US markets), the 2025 data are partial, and the descriptive-correlational approach precludes strong causal inference. Future research could extend the analysis through multivariate econometric models (e.g. VAR or GARCH), incorporate additional commodities and exchanges, and integrate spot-price dynamics to further disentangle real and financial drivers of agricultural price formation.

Ethical Approval

This study did not involve human participants or animals. It relies exclusively on publicly available, aggregated market data published by the CFTC. Therefore, ethical approval was not required.

Conflict Of Interest

The authors declare that they have no conflict of interest.

Data Availability Statement

The raw data supporting this study are publicly available on the CFTC Public Reporting Environment portal (Commitments of Traders, Disaggregated Futures Only reports). The processed dataset and the variable selection legend are available from the authors upon reasonable request.

Declaration Of Generative Ai and Ai-Assisted Technologies in the Writing Process

During the preparation of this manuscript, the authors used AI-assisted tools to support language editing, text organization, and literature review. All intellectual content, empirical analysis, data interpretation, and conclusions are the sole responsibility of the authors. The authors have reviewed and edited all AI-assisted content and take full responsibility for the final manuscript.

REFERENCES

1. CFTC (n.d). Disaggregated Commitments of Traders Report: Explanatory Notes. US Commodity Futures Trading Commission. Available at <https://www.cftc.gov/MarketReports/CommitmentsofTraders/index.htm> (Disaggregated Explanatory Notes).
2. CFTC (2021). Commitments of Traders report: Analysis of pandemic impacts. U.S. Commodity Futures Trading Commission.
3. Sanders, D. R., & Irwin, S. H. (2011). The impact of index funds in commodity futures markets. *Journal of Agricultural Economics*, 62(2), 215–234. <https://doi.org/10.1111/j.1477-9552.2010.00286.x>
4. Gilbert, C. L. (2010). Speculative influences on commodity futures prices 2006–2008 (UNCTAD Discussion Paper No. 197). United Nations Conference on Trade and Development.
5. FAO. (2021). The state of food security and nutrition in the world 2021. Food and Agriculture Organization of the United Nations. <https://www.fao.org/documents/card/en/c/cb4474en>
6. World Bank. (2022). Commodity markets outlook, October 2022. World Bank.
7. Irwin, S. H., & Sanders, D. R. (2012). Testing the Masters hypothesis in commodity futures markets. *Energy Economics*, 34(3), 882–890. <https://doi.org/10.1016/j.eneco.2011.09.002>
8. Shiller, R. J. (2000). Irrational exuberance. Princeton University Press.
9. Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47(2), 263–291. <https://doi.org/10.2307/1914185>
10. Brunetti, C., & Büyüksahin, B. (2009). Is speculation destabilizing? U.S. Commodity Futures Trading Commission.

11. Stoll, H. R., & Whaley, R. E. (2010). Commodity index investing and commodity futures prices. *Journal of Applied Finance*.
12. Kim, A. (2015). Does futures speculation destabilize commodity markets? *Journal of Futures Markets*.
13. Tang, K., & Xiong, W. (2012). Index investment and the financialization of commodities. *Financial Analysts Journal*, 68(6), 54–74. <https://doi.org/10.2469/faj.v68.n6.5>
14. Friedman, M. (1953). *Essays in Positive Economics*. University of Chicago Press.
15. CFTC. (2023). *Disaggregated Commitments of Traders: Methodology and explanatory notes*. U.S. Commodity Futures Trading Commission.
16. FAO. (2022). *The state of food security and nutrition in the world 2022*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/documents/card/en/c/cb9479en>
17. FAO. (2023). *The state of food security and nutrition in the world 2023*. Food and Agriculture Organization of the United Nations. <https://www.fao.org/documents/card/en/c/cc3017en>