Rediscovering Conditional Entry:

Profitability, Pricing, and Market Function in 1920s Wheat Futures and Options

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This paper reconstructs the trading of short-term options—then known as "privileges"—on wheat futures at the Chicago Board of Trade in 1926. Drawing on rare archival records of exercise prices recorded in the pit at market close, and combining these with detailed transaction cost data, we offer a new test of market functioning under structural constraint. We show that actual trading profits were consistently smaller and more symmetric than those predicted by the Black model using historical volatilities. This result challenges traditional pricing-efficiency tests by shifting attention to realized profitability as a more behaviorally revealing metric. We also recover a forgotten but economically meaningful trading strategy, in which traders used privileges to conditionally enter the futures market only if intra-day prices moved favorably. This practice—an early form of bounded, intra-day optionality—bears striking resemblance to modern 0DTE strategies. Our findings broaden the understanding of market effectiveness in constrained institutional settings and highlight a disciplined market equilibrium—functionally efficient under informational and structural constraint—that reveals the enduring logic of short-horizon, risk-limited trading.

JEL Classification Codes: N22, G13, N52, G23

Key Words: Early Option Pricing, Profitability, Privileges

1 Introduction

This paper recovers and analyzes a forgotten options market from the 1920s: the privilege contracts traded daily on wheat futures at the Chicago Board of Trade. Using rare archival data recorded in the trading pit and detailed information on transaction costs compiled by federal investigators, we reconstruct the profitability of both actual market trades and counterfactual trades priced by the Black model.[1] The archival data allow us to evaluate not only how closely market prices aligned with theory, but how traders responded to institutional structures, membership boundaries, and cost constraints.

Public criticism of privilege trading in the 1920s often framed it as speculative and destabilizing. Yet regulators and exchange officials alike struggled to define what legitimate option trading might look like. In the absence of clearly recorded prices or volumes, policy debates revolved around theory and assumption. What makes the data examined here so valuable is that it offers direct evidence—at the level of pricing, cost, and realized outcome—of how privilege contracts actually functioned in practice. Rather than evaluating this market solely by its pricing errors relative to theoretical models, we assess it in

[1] These data come from unpublished documents of the Grain Futures Administration (GFA), housed in the National Archives. See especially Hoffman (1928) and Mehl (1934), discussed below.

terms of how it worked: how profits were bounded, strategies adapted, and entry into the futures market conditioned by optionality.

The data we analyze were originally collected by the Grain Futures Administration (GFA), the first federal agency tasked with regulating U.S. futures markets. Between 1926 and 1934, GFA economists G.W. Hoffman and Paul Mehl conducted on-site observations at the Chicago Board of Trade, recording exercise prices for privilege contracts and documenting transaction costs with unusual care. Their work shaped the official opposition to options trading, culminating in the CBOT's voluntary suspension of privileges in 1930 and their prohibition under federal law in 1936. But it also left behind an empirical record of extraordinary detail—arguably the only such dataset available for early twentieth-century American options markets. It provides rare evidence of how a short-term, structurally constrained options market functioned.

This paper makes three contributions. First, it presents the most complete reconstruction of privilege option trading in the pre-regulatory era, based on trade-level prices and empirically grounded cost data. Second, it links information, structure, and behavior to explain why actual market profits were consistently more centered and less volatile than those predicted by the Black model using historical volatilities—a pattern consistent with conservative, information-cautious pricing and a functionally efficient equilibrium under constraint. This suggests that traders pursued strategies that prioritized bounded risk

and conditional entry, rather than speculative exposure. Third, it recovers a distinct trading practice—using options not to hedge or speculate per se, but to enter the futures market only if price movements were favorable. In the "trading against bids and offers" (TABO) strategy we examine in detail, traders used overnight privileges to commit to futures positions only when next (intra) day futures prices confirmed their expectations. This early form of optionality parallels modern 0DTE strategies and expands our understanding of how derivative markets function under structural and institutional constraints.

We evaluate this market by comparing the net profits realized in actual trades to those implied by the Black model (Black 1976), using a consistent volatility proxy. Rather than emphasizing pricing errors or deviations from theoretical premiums, we treat realized profitability—adjusted for transaction costs—as a more behaviorally meaningful indicator of market functioning. This approach reveals how traders adapted to structural constraints and institutional rules, often favoring risk-limiting strategies. Among the results, we identify a volatility smile in implied pricing and a pronounced boundedness in realized profits—features that together suggest a market shaped by limited, but effective, rationality. The remainder of the paper proceeds as follows: Section 2 describes the historical and institutional context of privilege trading. Section 3 introduces the data and outlines our

methodology for calculating net profits. Section 4 presents our main empirical results. Section 5 analyzes the rediscovered TABO trading strategy in detail. Section 6 reframes the interpretation of market functioning. Section 7 concludes.

2 Historical and Institutional Context

The structure of the 1926 privilege market was shaped by both institutional constraint and market convention. Privileges were written on wheat futures contracts, sold at a flat premium of five dollars per 5,000-bushel futures contract, and exercised at the close of the next day's futures session. Given a fixed premium, traders were focused on negotiating an exercise price, limiting the variation in moneyness that characterized today's options markets. Because the contracts were not exchange-settled, the market's institutional architecture was lightweight but tightly coupled to daily price dynamics. From an analytical standpoint, this created an informationally thin environment for model-based valuation: volatility estimates could be drawn only from recent closing prices, while traders themselves observed richer intraday movements, order flow, and participant behavior. The Black model used later in our comparison therefore serves as a deliberately limited benchmark, calibrated to what could be known from published data rather than what was expe-

rienced in the pit. Traders seeking optionality were constrained not only by cost structures, but by a limited menu of strategic positions and asynchronous futures and options trading hours.[2]

Although privilege contracts were actively traded, the Chicago Board of Trade itself maintained an ambiguous posture toward their legitimacy. As Hoffman observed in his 1928 report to the GFA, "No record is kept by the Board of Trade of the volume of trading in bids and offers" (p. 7). The exchange allowed privileges to continue as informal adjuncts to futures, but offered no clearing, no oversight, and no public record of their use. This institutional ambiguity gave the Grain Futures Administration—established in 1922 under the Grain Futures Act—a unique vantage point. GFA field agents, including Hoffman and Mehl, became the only systematic observers of privilege trading, gathering price and cost data with a level of detail that the exchange itself declined to produce.[3]

Hoffman and Mehl brought distinct interpretive lenses to their regulatory work. Hoffman, a marketing professor at the Wharton School, approached privilege trading with

[2] In 1926, the wheat futures market at the CBOT closed at 1:15 p.m., while privilege contracts were traded in the same pit from 2:00 to 2:30 p.m. The two markets were never open at the same time. This non-overlap constituted a structural constraint: it precluded simultaneous observation or hedging, forcing traders to operate under sequential access. Privileges had to be priced and purchased after the futures market had closed and could only be exercised the following day, shaping them into tools for conditional entry rather than real-time arbitrage or hedge instruments. This sequential structure represents a fundamental institutional constraint: it separated information arrival from execution, compelling traders to rely on judgment and memory rather than instantaneous hedging. The market's timing thus built prudence directly into its design.

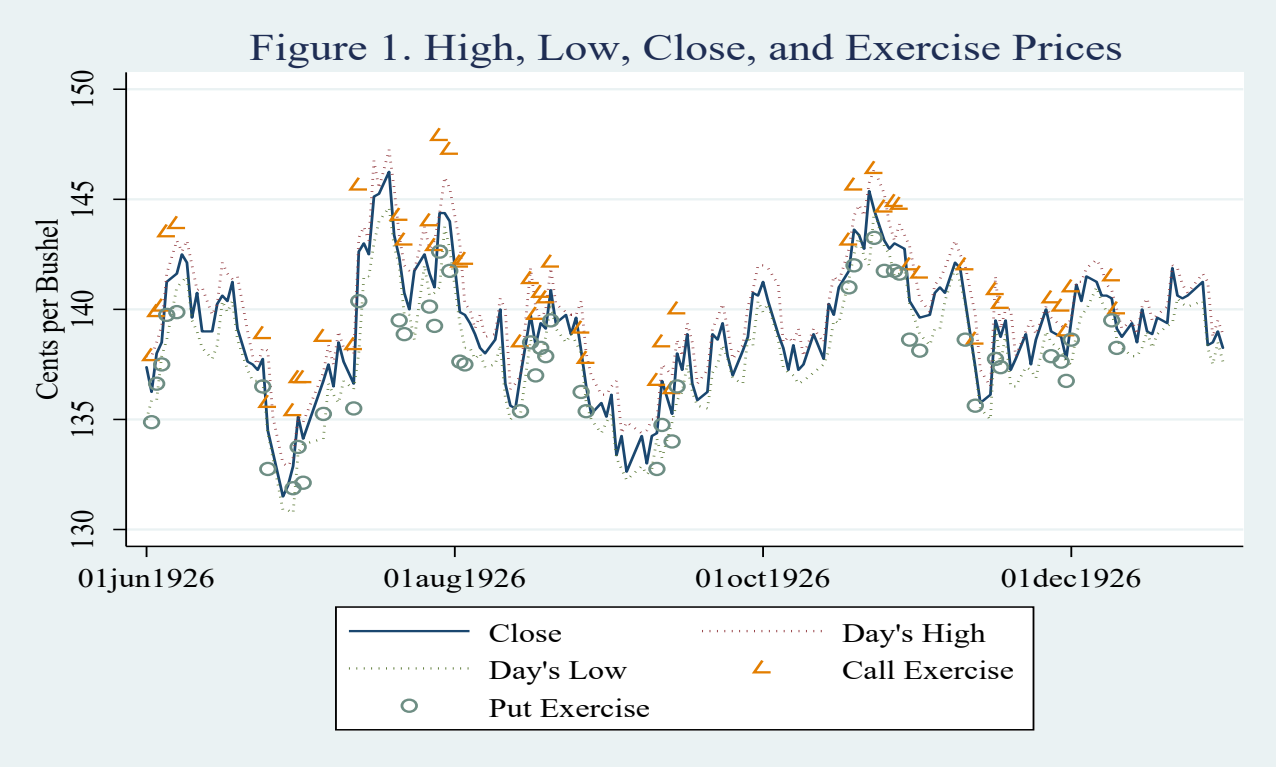
[3] The Grain Futures Act of 1922 (42 Stat. 998) authorized federal oversight of grain futures trading and established the Grain Futures Administration within the USDA. It was a forerunner to the Commodity Exchange Act of 1936.

a degree of theoretical skepticism. While his reports acknowledged the possibility of hedging, he expressed uncertainty over whether the contracts served any clear economic function. Mehl, in contrast, grounded his analysis in trader behavior and transaction data, producing detailed breakdowns of cost structures and the actual mechanics of exercise. Although neither economist could draw definitive conclusions about market legitimacy, their writings preserved a rich empirical account of how traders responded to risk, cost, and constraint.

The result is a fragmentary but unusually precise window into an otherwise undocumented market. The GFA's price and cost records do not offer a full picture of volume or trader intent, but they allow us to reconstruct what matters most: who stood to gain or lose, and how that pattern compared to what theory would predict. In the next section, we describe how we use this material to measure realized and counterfactual profits and interpret them as indicators of market structure, strategy, and trading constraints. Taken together, these institutional features define the analytical frame of the study: a structurally bounded, informationally uneven market in which traders adapted rationally within constraint. The next section formalizes this framework using the Black model as an informationally thin point of reference for assessing realized outcomes.

3 Data and Methodology

The dataset used in this paper is drawn from unpublished records of the Grain Futures Administration, which include closing exercise prices for 51 privilege trading sessions executed on the CBOT in 1926, see **Figure 1**.[4] We define each trading strategy by option type (call or put), position direction (long or short), membership status of the trader (member or non-member), and strategy style: EMC vs TABO.[5] The same privilege contract can support different trading strategies, and we evaluate two distinct approaches observed or inferred from market behavior.



[4] Exercise prices are from Hoffman (1928) and transactions costs and fees are from Mehl (1931).
[5] Summary statistics for the implied volatility (AIV) and the various historical volatility proxies (e.g., SD1–SD6, HL1–HL6, GK1–GK6, RS1–RS2) are reported in Appendix Table A1. These descriptive moments help contextualize the relative scale, dispersion, and skewness of the candidate volatilities later used in model comparisons.

In the **EMC-style strategy**, the trader holds the privilege without taking a futures position and exercises it only if it is profitable at the close of the next trading day (T+1)—a passive directional bet. For the **TABO strategy**, we assume the trader enters a futures position during T+1 at a favorable observed price and offsets it with the option at the close. In operational terms, we treat this favorable intraday price as the day's low high for call privileges buyers and the day's high low for put privileges buyers, corresponding to the most advantageous entry consistent with conditional market participation. This form of "trading against bids and offers" was the more commonly observed strategy according to both Hoffman (1928) and Mehl (1934). Although the records do not include intraday quotes or volumes, they provide exercise prices and closing futures prices sufficient to estimate net profits under both behavioral regimes.

To assess market functioning, we compare realized profits under each strategy to profits implied by a Black-model benchmark using historical volatility. In our framework, the Black benchmark serves as an informationally thin counterfactual: it uses only volatility inferred from closing prices and therefore excludes the intraday movements, trader behavior, and timing asymmetries that shaped privilege trading in 1926. Comparing market and model outcomes thus contrasts a data-limited formula with traders' richer experiential knowledge. For EMC, the option is exercised only if it is in the money at T+1 close. For TABO, we assume the trader enters a futures position during T+1 at a favorable observed

price and offsets it with the option at the close. In operational terms, we treat this favorable intraday price as the day's low for call privileges and the day's high for put privileges, corresponding to the most advantageous entry consistent with conditional market participation. All profits are calculated net of documented transaction costs, including federal taxes. This approach allows us to evaluate how privilege trading actually performed relative to theoretical pricing—and to interpret those results not only in terms of efficiency, but also of behavior and structural constraint. While the five-day standard deviation (SD5) is used as the baseline volatility proxy in our main results, alternative measures—such as high-low and Garman-Klass estimates—are reported in the appendix. These alternatives yield qualitatively similar findings and support the robustness of the comparative framework. The next section reports how this constrained, information-thin benchmark compares to the realized outcomes of a market that was structurally limited but functionally efficient.

4 Empirical Findings

4.1 Prior Literature

Recent studies have revived interest in early options markets, often evaluating them in terms of pricing efficiency, profitability asymmetries, or institutional design. Mixon (2009a, 2009b) and Kairys and Valerio (1997) examined nineteenth-century equity

options using indicative published quotes (rather than archival pit-observed prices), concluding that such contracts were frequently overpriced and systematically unprofitable for buyers. Their findings align with mid-twentieth-century studies such as Franklin and Colberg (1958) and Boness (1964), which also found early options to be more favorable to sellers than buyers. These earlier findings provide a useful contrast for our study, which examines a structurally constrained market with a $5 premium and sequential trading hours. In this context, differences between observed and model outcomes reflect limits of information and market design rather than systematic bias or misperception.

More recent work has focused on the role of transaction costs and informational frictions in shaping observed pricing patterns. Bellora, Mazzei, and Maurette (2021) emphasize that even modest cost assumptions can render seemingly mispriced options rational. Baule, Frijns, and Schlie (2024) extend this line of thinking to modern equity markets, showing that trader behavior around short-dated options often reflects bounded rationality and satisficing strategies. These findings suggest that deviations from theoretical pricing may be features of adaptive behavior rather than signs of dysfunction. Our approach differs in several respects. First, we use archival trade-level data from a short-lived, lightly regulated commodity options market. Second, we estimate profits net of historical

transaction costs rather than evaluating premium levels alone. Third, we interpret profitability patterns not solely as evidence of pricing error, but as reflections of market structure and boundedly rational behavior within constraint.

4.2 Profitability Results

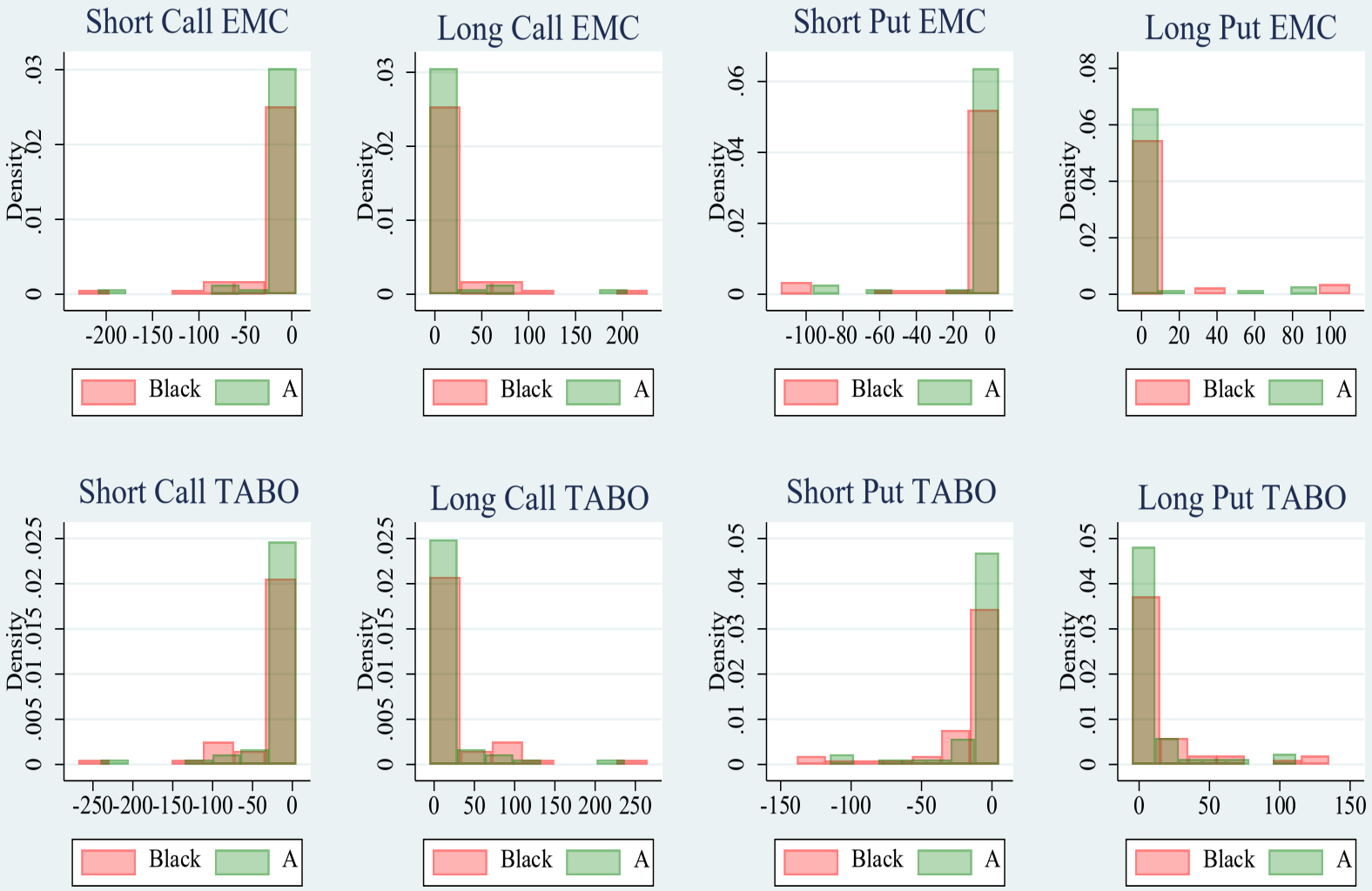
Realized profits from privilege trading differed systematically from those implied by the Black model. For both EMC and TABO strategies, actual profits exhibited lower dispersion and fewer extreme outcomes than the Black-based counterfactuals. This was particularly evident in short positions, where the model often predicted large profits that did not materialize in actual trades. While Black-based profits were theoretically symmetric—equally likely to yield high gains or losses—real-world outcomes were more compressed, with traders on both sides achieving modest, risk-limited results. This pattern is clearly visible in **Figure 2 Top**, which compares profit distributions under the EMC strategy using market and Black-model prices.

This same structure appears in **Figure 2 Bottom**, which plots TABO-based profits under both actual and model-implied assumptions. Here, the boundedness is even more pronounced. The TABO strategy, by enabling intraday futures positions to be closed via the privilege, allowed traders to react tactically to favorable price moves and avoid deep losses. The resulting distribution reflects this selectivity: profits cluster around modest, positive outcomes with significantly fewer extreme values than Black would predict.

A directional asymmetry is also evident. The Black model tended to overstate profits for writers—especially short calls—suggesting that market participants priced these contracts more conservatively than theoretical valuation would imply. This asymmetry could reflect several overlapping forces: the greater margin exposure and reputational stakes faced by writers, institutional norms favoring prudence, or more general caution toward large potential losses (Kahneman and Tversky 1979, De Bondt and Thaler 1985). Whatever the source, the result was a consistent compression of risk on the short side—a

Figure 2 Profits for Members: Black(SD5) 'B' vs Actual 'A'

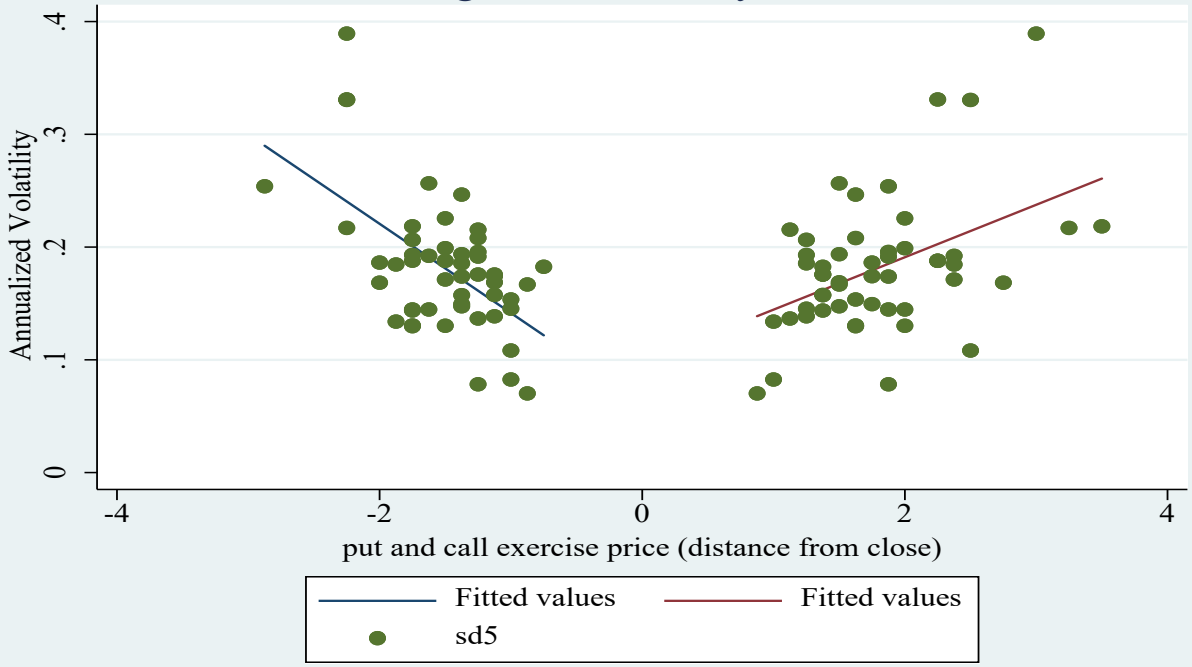
EMC and TABO



pattern that fits the market's broader tendency toward bounded, structurally disciplined outcomes.

While the Black model's profit predictions assume constant volatility, the market's actual pricing behavior showed systematic variation by moneyness. In particular, we observe a **volatility smile**: options further from the money were implicitly priced with higher volatility than at-the-money contracts. This pattern, illustrated in **Figure 3**, is consistent with modern findings in options markets and suggests that traders may have adjusted perceived risk using rules of thumb or intuitive reference points. Even without formal modeling, privilege writers appear to have priced tail risk more aggressively, reinforcing the observed asymmetry in realized profits. This pattern is consistent with conservative pricing under asymmetric information: traders limited exposure and accepted lower mean returns in exchange for smaller tail risks, producing an outcome that was cautious rather than inefficient

Figure 3. Volatility Smile



4.3 Speculator Activity and Profit Variance

The presence of large speculators in the wheat futures market offers a unique opportunity to assess how privilege trading behavior responded to changes in market context. The dataset includes a binary variable (Speculators = 1) marking the 16 trading days when large speculators were identified as active in the futures market.[6] These days serve as a natural point of comparison for testing whether pricing behavior or outcomes were different under more competitive or information-sensitive conditions.

Descriptive statistics reinforce this behavioral interpretation. **Table 1** compares actual TABO profits for members with those generated by Black-model pricing. These comparisons allow us to evaluate how a market constrained by fixed pricing and sequential trading hours performed relative to an informationally thin benchmark. Differences between realized and model outcomes therefore reflect the limits of data and structure rather than systematic bias or misperception. The profit distributions observed in actual TABO trades were consistently more centered than those implied by the Black model. Across all four positions, actual mean profits were smaller in magnitude, and standard deviations were lower—indicating tighter clustering around moderate outcomes. While the kurtosis of

[6] Hoffman defines large speculative activity retrospectively, using trading records from clearing firms. In his study of 1926 wheat trading, he identifies days when "the combined net of the purchases and sales of 5 leading speculators amounted to 2,000,000 bushels or more in all wheat futures" (1928, 21). Most of our price observations are in pairs and the "speculator-active day" takes place on the **second** day of the pair.

actual profits exceeded that of the Black-generated counterfactuals, this does not contradict boundedness. Instead, it reflects a pattern of concentrated moderate returns with occasional large outcomes—a structure consistent with risk-limiting heuristics and satisficing behavior.[7] These results suggest that traders did not attempt to maximize expected value or match theoretical variance, but rather sought to avoid large losses while capturing modest, plausible gains. On speculator days, the same pattern held: actual profits showed lower means and standard deviations than the Black benchmarks, while kurtosis remained higher. The elevated kurtosis in actual returns—especially alongside lower variance—reinforces the interpretation of bounded rationality: traders truncated extreme losses but occasionally realized large profits when price moves aligned with strategic thresholds.

Table 1. Dispersion and Tail Risk of TABO Strategy Profits on All 51 Days: Actual vs. Black Model

Position	Actual mean	Black Mean	Actual SD	Black SD	Actual Kurtosis*	Black Kurtosis*
Long Call	10.96	16.8	42.51	48.64	19.96	14.75
Short Call	-12.55	-18.73	43.27	49.37	19.24	14.28
Long Put	8.95	12.65	30.75	33.98	11.31	7.67
Short Put	-10.27	-14.1	31.74	35.03	10.7	7.31

*Excess Kurtosis reported

[7] The largest positive profit observations occurred near the expiration of the May and July 1926 wheat contracts. Archival correspondence in the Grain Futures Administration records (RG 145, Box 282, National Archives at Kansas City) attributes these outliers to end-of-contract delivery frictions and corner-like squeezes that produced abrupt price adjustments in the expiring month. The GFA's 1927 *Annual Report of the Grain Futures Administration* (pp. 54–56) noted that "privileges exercised in the final days of trading often reflected exceptional price movements connected with delivery pressure." The Chicago Board of Trade subsequently amended its privilege rules to restrict exercise on the final trading day and to require earlier notice of intent to exercise, precisely to prevent recurrence of such expiration-related anomalies.

We find that **profit variance increased** on speculator days, especially under the TABO assumption. As shown in **Figure 4**, the distribution of actual TABO profits on speculator days exhibits wider tails and more dispersion than on non-speculator days. This suggests that traders may have responded more aggressively to price signals or volatility opportunities when informed or strategic traders were present. The effect is more muted for EMC-style trades, which lacked the intraday tactical dimension. **Table 2** shows that on days when large speculators were active in the futures market, actual TABO profits remained more centered and less dispersed than the Black-model benchmarks. In all four positions, the **mean actual profit was closer to zero** than the model-predicted mean, and **actual standard deviations were lower**, consistent with bounded trading behavior that avoids extreme exposure. Notably, **kurtosis was consistently higher in the actual data**—a combination of tighter variance and fatter tails that suggests traders limited most outcomes to modest profits or losses, but occasionally realized larger deviations when conditions aligned. This pattern reflects bounded rationality in an institutional sense: traders operated within structural and informational limits, using simple thresholds to manage risk exposure and capture favorable moves when conditions permitted. Even under the potentially more volatile conditions created by speculator activity, actual outcomes showed **greater central mass and tail sharpness** relative to the Black model—further evidence

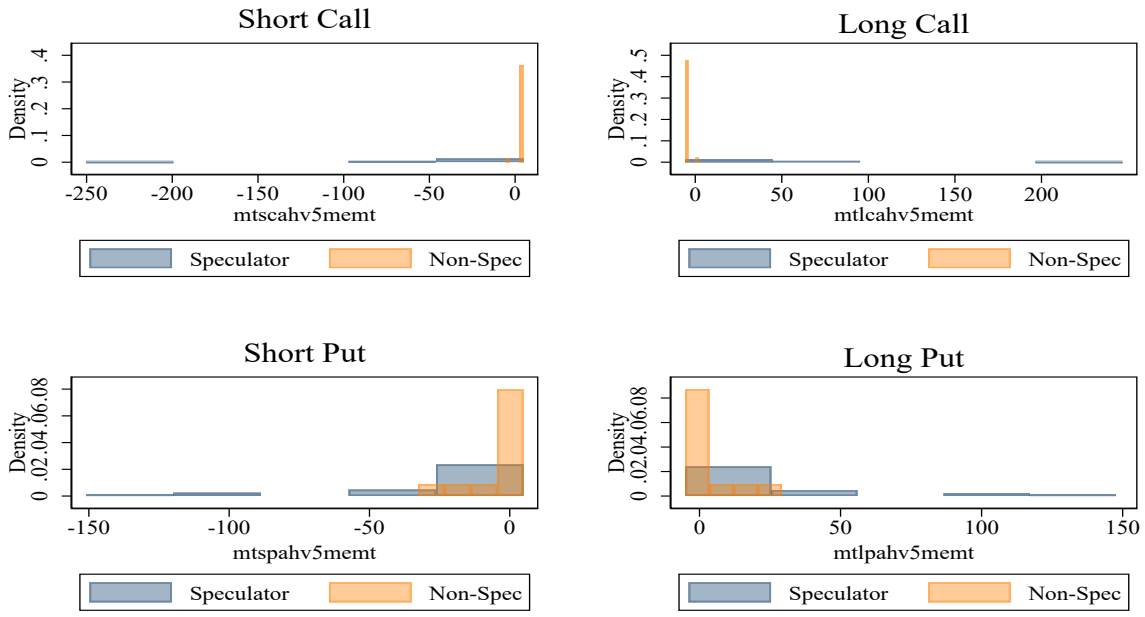
that behavior was shaped by risk-limiting strategies rather than by full exploitation of expected value or variance.

While the overall dispersion of actual profits remained tighter than in the Black model, the **profile of outcomes on speculator days shows subtle directional shifts**, especially in short positions.[8] These asymmetries suggest that some traders adjusted their usual risk limits in response to changing market conditions—accepting slightly greater exposure when large speculators were active or when anticipated price moves created transient opportunities, particularly on the short side. The result is not a wholesale loss of boundedness, but a flexible application of heuristics in more competitive contexts. The empirical findings therefore illustrate how institutional design—a fixed $5 premium, sequential trading, and informational asymmetry—generated outcomes that were bounded yet functionally efficient when viewed against the model's data limitations.[9]

[8] The effect is concentrated on the call side: actual call profits, particularly for short positions, diverge more from the Black-model benchmarks than the corresponding puts. The call distances (cd) are slightly larger than the put distances (pd), meaning calls were written further from the money—consistent with greater caution about price rises. The put differences remain comparatively small, indicating that traders' adaptive responses under speculative conditions were strongest where upward price moves posed greater exposure.

[9] Comparable patterns of small, stable losses for risk-bearing participants appear in modern inventory-risk models of option market making (Grossman and Miller 1988; Bollen and Whaley 2004; Avellaneda and Stoikov 2008) and in early studies of commodity-market equilibrium under asymmetric exposure (Working 1953; Williams 1986). Mixon's (2008, 2009) examination of nineteenth-century equity options likewise finds systematically conservative pricing and modest average losses for option writers—evidence of a stable, functionally efficient equilibrium rather than mispricing. Together these studies support the interpretation of the 1926 privilege market as a structurally bounded yet operationally efficient system.

Figure 4. TABO Strategy: Actual Profits on Speculator vs. Non-Speculator Days



Each panel compares actual profit distributions by speculator activity (n = 51)

Table 2. Dispersion and Tail Risk of TABO Strategy Profits During the Speculator Days: Actual vs. Black Model

Position	Actual mean	Black Mean	Actual SD	Black SD	Actual Kurto-sis*	Black Kurto-sis*
Long Call	25.6	34.28	54.77	61.91	10.86	8.07
Short Call	-27.67	-36.53	55.61	62.73	10.5	7.84
Long Put	16.62	17.96	39.96	42.93	5.99	4.74
Short Put	-18	-19.34	41.1	44.06	5.75	4.62

*Excess Kurtosis reported

5 A Rediscovered Strategy: Conditional Market Entry

While early studies of privilege trading focused on premiums, mispricing, or hedging behavior, our findings suggest that traders also employed privilege contracts in a distinct strategic role: as a conditional mechanism for intraday market exit. This reinterpre-

tation follows naturally from the preceding empirical evidence of conservative, information-cautious pricing. It situates privilege trading within a framework of structural constraint and adaptive efficiency rather than emphasizing anomaly or bias. Under the TABO strategy—"trading against bids and offers"—a trader would take a position in the wheat futures market during the day and then use the privilege to **close that position via option exercise at the end of the session**. This allowed them to profit from favorable intraday movements while capping downside risk at the exercise price. Crucially, this is not a distinct contract form, but a flexible use of the same privilege instruments that also supported deferred strategies like EMC.

Contemporary observers noted this use of privileges. Mehl (1934, 13) describes a trader who enters and exits futures positions during the session, and then exercises the remaining privilege "thus leaving himself without open commitments at the end of the day."[10] Hoffman (1928) observed that many users of privileges were not hedging but pursuing short-term speculative opportunities, and noted that formal studies would be required to determine their actual function.[11]

In functional terms, the TABO strategy resembles how some institutional traders use modern **zero days to expiration (0DTE)** options—not primarily to leverage exposure,

[10] Mehl (1934, 13): "...he buys an additional 25,000 bushels when the price reaches 74⅞ cents and at 75½ cents he sells 25,000 bushels, and on the decline at the close to 74⅜ cents he 'puts' the remaining 25,000 to the seller of the bids thus leaving himself without open commitments at the end of the day."
[11] Hoffman (1928, 5): "It is not known whether these privileges are used for hedging, for speculation, or for manipulation. To determine these points, studies of actual cost and usage would be required."

but to **structure risk within narrow windows of time** (Dim, Eraker and Vilkov 2025). In 1926, the trader would first take a position in wheat futures during the trading day, then use the privilege to **close that position via option exercise at the exercise price**. This made the privilege a tool for conditional exit, offering downside protection without constraining intraday opportunity. The apparent use of simple thresholds—like one-sided engagement with favorable movements—aligns with the 'fast and frugal' heuristics documented by Gigerenzer and Selten (2001), wherein structure and habit substitute for formal optimization. While 0DTE options today are often associated with speculative entry, institutional usage frequently mirrors the logic of TABO: the option to reshape risk. The privilege thus served as the basis for a behavioral and structural solution to intraday uncertainty—a strategy for risk management, not just speculation. The privilege market thus provides an early, explicit form of short-term conditional exit that anticipates aspects of modern intraday risk management. It offers a historically grounded and behaviorally plausible approach to managing risk under structural constraints. The privilege market of the 1920s thus provides early evidence of tactical options usage—more aligned with contemporary short-dated strategies than previously recognized. In this sense, the privilege market's structural discipline and informational limits fostered a form of functional efficiency: traders achieved risk control and tactical flexibility without the data-rich tools available in modern markets.

6 Rethinking Market Function

The following discussion interprets these results in light of the informational, structural, and behavioral factors shaping the privilege market, and situates them against the behavior of modern short-dated options. The historical literature on options markets has often evaluated performance through the lens of pricing efficiency — typically defined as the alignment between observed option premiums and theoretical values such as those generated by the Black model. By this measure, the 1926 privilege market performs surprisingly well: actual trading outcomes often yielded more centered and less volatile profits than theoretical predictions. But this result complicates the very standard it seems to affirm.

Pricing efficiency, as conventionally understood, implies that market participants act as rational arbitrageurs, integrating all available information into price. Yet the privilege market of 1926 functioned under sharp structural and institutional constraints: a fixed $5 premium, a negotiated exercise price, next-day expiration, and highly asymmetric access to execution and information. Within these limits, traders pursued strategies that controlled downside exposure and structured risk intraday — tactics that reflect institutionally bounded rationality, not pure arbitrage. Following Simon's (1955) foundational conception of satisficing behavior, they acted rationally within the informational and structural bounds of their market, limiting exposure to behaviorally manageable risks.

From an ecological perspective (Smith 2003), the behavior observed here may represent a rational adaptation to institutional constraints, even if it deviates from standard models of pricing efficiency.

This points to a broader evaluative frame: not whether markets matched theoretical prices, but how well they functioned under sharp structural and institutional constraints.[12] The tight, asymmetric profit distributions observed—especially under the TABO strategy—signal a kind of operative rationality, in which traders acted effectively given limited instruments and information. From this perspective, realized profitability—rather than pricing alignment—may offer a more informative benchmark for market function. Specifically, this offers an interesting interpretation of market model differences.

The differences between market and model outcomes can be understood as the joint product of information, structure, and institutional behavior. Traders in 1926 possessed more contextual information than the Black model could capture. They remembered the intraday "string" of price movements, the tempo of trading, and the identities of active participants—signals that shaped expectations in ways absent from our historical volatility inputs. At the same time, they knew that much remained unseen: episodes of

[12] Despite being limited to a fixed $5 premium per privilege, actual trades often came close to Black model values. Across a range of volatility inputs, the model-implied premium exceeded the fixed market premium, typically by 3–6% (see Table A2). This suggests that traders, despite structural pricing constraints, achieved outcomes that were competitively priced by contemporary standards.

asymmetric information, corners, and squeezes were part of market memory. This awareness of potential information imbalance made them price cautiously. Their conservatism is visible in the narrower spreads in exercise prices and lower mean profits than a Black-priced world would produce.

Market structure reinforced this informational discipline. Futures trading closed before the options (privilege) market opened, creating a period during which new information could arrive but not be hedged. Moreover, the fixed five-dollar premium restricted price adjustment; traders could express risk views only by negotiating exercise prices. Those institutional features compressed both expected profits and realized dispersion. Apparent "underpricing" relative to the Black model therefore reflects not misjudgment or bias but an equilibrium generated by limited price flexibility, asymmetric information, and prudential restraint. This was a functionally efficient market — thin in data but rich in experiential knowledge.

Modern short-dated equity options occupy the opposite corner of this equilibrium. Studies of zero- and one-day S&P 500 options (Todorov and Zhang 2022; Dim, Eraker and Vilkov 2023; Božović 2025; Vasquez, Amaya et al. 2025), find that their implied volatilities mirror current volatility conditions yet add little power for forecasting future variance. Despite this weak forecasting ability, today's one-day options typically trade above Black-Scholes values when volatility is estimated from realized or nearby-term data. The rich

pricing reflects compensation for inventory risk, event jumps, and intraday risk appetite. The 1926 privileges, by contrast, were underpriced relative to their Black benchmark—pricing caution rather than risk-seeking. Both markets therefore share limited predictive content, but they differ in structure and temperament: modern 0DTE options are exuberant in an information-dense environment, while the interwar privileges were disciplined and conservative in an information-thin one.

The privilege market, therefore, did not simply fail or succeed relative to modern option theory. It operated differently, with traders adapting strategies to the tools available. Efficiency, in this setting, is not about matching a model—it is about managing uncertainty in context. Recognizing this allows us to shift from binary judgments of market success to a richer account of how institutions, instruments, and behavioral adaptations jointly shaped trading outcomes.

7 Conclusion

This paper has reexamined the short-lived market for wheat privileges on the Chicago Board of Trade in 1926, using a rare dataset of actual exercise prices and trading cost to assess how options functioned in practice. We find that privilege trading, though structurally constrained by a fixed $5 premium, an exercise price, and non-overlapping trading hours with the futures market, produced realized profits that were more centered

and less volatile than those predicted by the Black model. This bounded profitability suggests that traders operated with a form of rational adaptation to informational and structural constraint—functionally efficient within the limits of available data and institutional design.

We also recover a historically underappreciated trading strategy—conditional intraday exit via privilege exercise—which resembles modern short-dated risk management using 0DTE options. This "TABO" approach illuminates how traders used simple contracts to navigate uncertainty, not merely to speculate or hedge, but to close futures positions tactically. In this sense, privilege trading appears as a structurally disciplined response to limited information—an early expression of functional efficiency rather than speculative exuberance. By shifting focus from pricing alignment to behavioral effectiveness, we propose a broader perspective on what constitutes a well-functioning market—one attentive to profit structure, strategy design, and institutional constraint.

These findings encourage further research at the intersection of financial history, market microstructure, and behavioral finance. The 1926 privilege market offers not only a test case for early derivative pricing, but also a window into how market participants shaped and constrained their own tools of speculation. Future studies might extend this inquiry to other overlooked instruments, reassessing historical markets not by how closely

they matched idealized efficiency, but by how their structures shaped the strategies they enabled and the behaviors they contained.

Appendix: Construction of Counterfactual Prices and Profits

This appendix describes how we constructed the Black model prices and corresponding trading profits used throughout the analysis. We applied the Black (1976) formula for pricing European options on futures, using 30 different historical volatility estimates as inputs. We considered 30 different volatility measures shown in **Table A1**. We examined many measures of historical price volatility to identify which volatilities appear to have influenced the market's assessment of risk as reflected in AIV. We consider price movements over the just completed trading day as well as over the past six days be-cause the trading week was five and a half days in the 1920s. Across each of these temporal windows, we calculate annualized standard deviation of logarithmic returns on closing prices (SD), the Parkinson (1980) volatility estimates (HL); Garman and Klass (1980) estimates (GK); Rogers-Satchell (1991) estimates (RS); and Yang-Zhang (2000) estimates (YZ). **Figure A1** shows AIV and five day historical volatilities over our 1926 sample period.

We define the "pricing error" as the deviation of the model-implied premium from the actual $5 market premium. **Table A2** reports the average premium from each historical volatility. Only the historical volatilities SD2 through SD6 generate premia that do not significantly differ from the market premium of $5 at the 5% significance level: SD4, SD5, and SD6 provide premium values of $5.19, $5.30, and $5.33 with associated pricing errors of 3.8%, 6% and 6.5%.

Figure A1. Historical Five-Day Volatilities and AIV

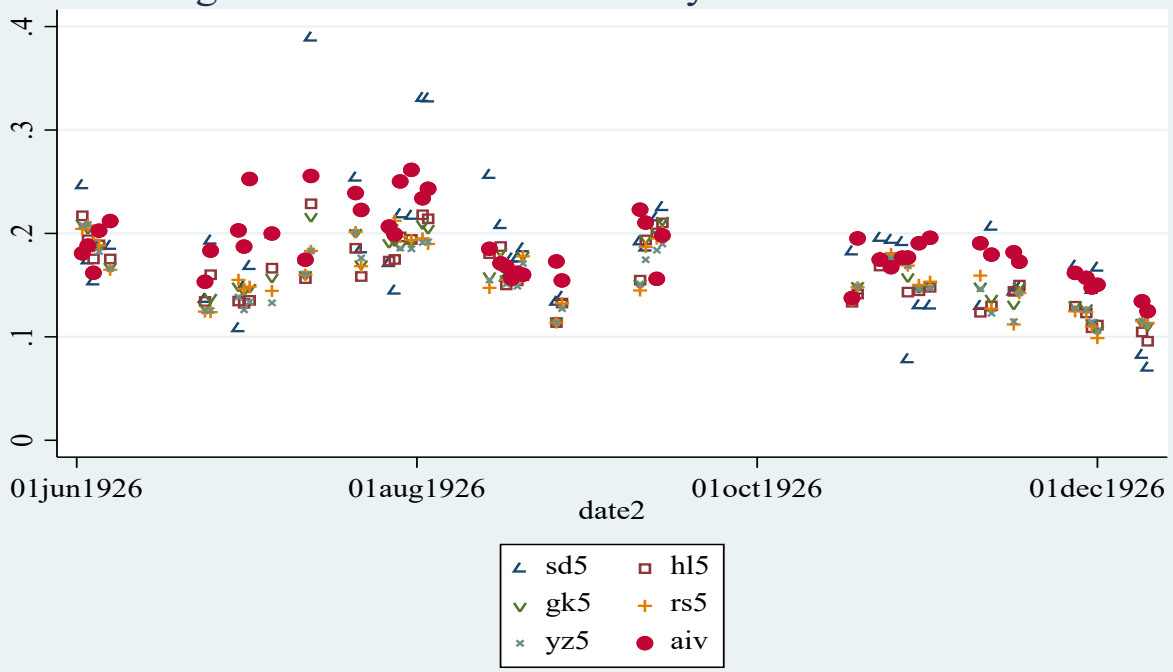


Table A1 Descriptive Statistics of AIV and Historical Volatilities

Variables	Obs	Mean	Std. Dev.	Min	Max	p1	p99	Skew.	Kurt.
aiv	51	.187	.033	.125	.261	.125	.261	.544	2.735
sd1	51	.185	.144	.015	.76	.015	.76	1.559	6.466
sd2	51	.169	.127	.011	.629	.011	.629	1.112	4.594
sd3	51	.176	.083	.039	.509	.039	.509	1.219	6.482
sd4	51	.178	.067	.034	.417	.034	.417	1.18	6.246
sd5	51	.181	.059	.07	.389	.07	.389	1.217	5.753
sd6	51	.182	.051	.084	.349	.084	.349	.904	4.326
hl1	51	.163	.067	.066	.397	.066	.397	1.248	4.994
hl2	51	.159	.048	.082	.294	.082	.294	.52	3.01
hl3	51	.159	.041	.086	.25	.086	.25	.194	2.487
hl4	51	.159	.035	.093	.25	.093	.25	.19	2.735
hl5	51	.16	.032	.096	.229	.096	.229	.154	2.31
hl6	51	.159	.03	.105	.216	.105	.216	.1	1.948
gk1	51	.163	.059	.077	.357	.077	.357	1.221	5.096
gk2	51	.161	.044	.092	.267	.092	.267	.55	2.766
gk3	51	.163	.038	.097	.25	.097	.25	.299	2.388
gk4	51	.163	.033	.1	.237	.1	.237	.184	2.481
gk5	51	.163	.03	.108	.217	.108	.217	.024	2.02
gk6	51	.163	.028	.115	.208	.115	.208	.013	1.746
rs1	51	.151	.062	0	.328	0	.328	.074	3.604
rs2	51	.155	.045	.052	.252	.052	.252	.099	2.47
rs3	51	.158	.039	.09	.232	.09	.232	.039	2.09
rs4	51	.16	.033	.096	.22	.096	.22	.061	2.1
rs5	51	.16	.031	.099	.212	.099	.212	-.109	1.936
rs6	51	.16	.029	.109	.211	.109	.211	-.073	1.741
yz1	51	.158	.053	.052	.314	.052	.314	.555	3.302
yz2	51	.155	.04	.071	.232	.071	.232	.113	2.284
yz3	51	.156	.036	.096	.224	.096	.224	.125	2.131
yz4	51	.157	.031	.103	.221	.103	.221	.202	2.153
yz5	51	.157	.03	.106	.209	.106	.209	.036	1.834
yz6	51	.156	.029	.11	.205	.11	.205	.073	1.711

Table A2 Test of Black Premia against 5$ actual

	obs	Mean	St Err	t value	p value
av sd1day	51	8.663	1.762	2.079	.043
av sd2day	51	6.88	1.391	1.351	.182
av sd3day	51	5.513	.834	.615	.541
av sd4day	51	5.19	.635	.299	.766
av sd5day	51	5.3	.545	.55	.585
av sd6day	51	5.325	.464	.702	.486
av hl1day	51	4.29	.618	-1.149	.256
av hl2day	51	3.663	.444	-3.011	.004
av hl3day	51	3.461	.352	-4.375	0
av hl4day	51	3.361	.289	-5.671	0
av hl5day	51	3.428	.267	-5.887	0
av hl6day	51	3.404	.259	-6.162	0
av gk1day	51	4.191	.54	-1.498	.141
av gk2day	51	3.781	.435	-2.803	.007
av gk3day	51	3.751	.363	-3.436	.001
av gk4day	51	3.642	.301	-4.503	0
av gk5day	51	3.651	.277	-4.877	0
av gk6day	51	3.603	.253	-5.535	0
av rs1day	49	3.891	.511	-2.171	.035
av rs2day	51	3.505	.43	-3.472	.001
av rs3day	51	3.576	.374	-3.808	.001
av rs4day	51	3.506	.322	-4.649	0
av rs5day	51	3.498	.29	-5.169	0
av rs6day	51	3.437	.255	-6.15	0
av yz1day	51	3.85	.458	-2.51	.015
av yz2day	51	3.397	.37	-4.324	0
av yz3day	51	3.387	.329	-4.901	0
av yz4day	51	3.297	.291	-5.841	0
av yz5day	51	3.292	.274	-6.238	0
av yz6day	51	3.219	.243	-7.317	0

For each volatility estimate and trading day, we solved for the exercise price that yields a $5 option premium. These Black-derived exercise prices were then used to simulate gross and net trading profits under both EMC and TABO strategies. All transactions cost parameters were taken from Mehl (1931) and included federal taxes, broker commissions, and membership status. Table A3 lists the assumed costs for both members and nonmembers. Table A4 reports the Total Gross Profit, Total Initial Trading Cost, Exercise Cost, and Net Profit by Membership Type Who Used the EMC Strategy During the 51 Hoffman Days in $/5,000-bushel Contract. We compare observed profits and losses with those derived from simulated Black prices for Members (Table A5) then Non-Members (Table A6).

Table A3. The Commission Fee and Tax at Trade Initiation, Added Cost due to Exercise, and Total Cost ($/5,000-bushel contract) by Membership Type.

	Members			Nonmembers		
	Cost at Trade Initiation	Additional Cost When Exercised	Total Trading Cost When Exercised	Cost at Trade Initiation	Additional Cost When Exercised	Total Trading Cost When Exercised
Long Puts	$0.10	$1.95*	$2.05	$0.50	$13.20*	$13.70
Long Calls	$0.85**	$1.25	$2.10	$1.25**	$12.50	$13.75
Short Puts	$0.10	$1.25	$1.35	$0.50	$12.50	$13.00
Short Calls	$0.10	$1.25	$1.35	$0.50	$12.50	$13.00

* includes the 0.01% futures tax of about $0.70 when a short futures position is created.
** includes the $0.75 option tax paid by call option buyers to the sellers.

Table A4. Total Gross Profit, Total Initial Trading Cost, Exercise Cost, and Net Profit by Membership Type Who Used the EMC Strategy During the 51 Hoffman Days in $/5,000-bushel Contract

Option Position	Total Exercised Value as Gross Profit or Loss	Total Initial Receipt or Payment Including Premium	Total Exercise Cost	Total Transactions Cost Excluding Premium	Net Profit
Members					
Long Puts	300	-260.1	-15.54	-20.64	24.36
Short Puts	-300	249.9	-10	-15.1	-60.1
Transactions Cost for Puts	0	-10.2	-25.54	-35.74	-35.74
Long Calls[1]	506.25	-298.35	-11.25	-54.6	196.65
Short Calls	-506.25	249.9	-11.25	-16.35	-267.6
Transactions Cost for Calls	0	-48.45	-22.5	-70.95	-70.95
Nonmembers					
Long Puts[2]	275	-280.5	-52.76	-78.26	-58.26
Short Puts	-300	229.5	-100	-125.5	-170.5
Transactions Cost for Puts[2]	-25	-51	-152.76	-203.76	-228.76
Long Calls[1,2]	493.75	-318.75	-87.5	-151.25	87.5
Short Calls	-506.25	229.5	-112.5	-138	-389.25
Transactions Cost for Calls[2]	-12.5	-89.25	-200	-289.25	-301.75

[1] Initial trading cost of Long Calls includes the $0.75 Federal tax paid by call buyers which is subtracted as a part of the total exercise cost.

[2] Exercised value for nonmembers excludes the total abandoned amount of $25 for Long Puts and $12.50 for Long Calls.

Table A5 **Member** EMC Total Net Profits or Losses ($): Actual vs. Black-model over 51 Days

Variable	Long Call Profit	Variable	Short Call Profit	Variable	long Put Profit	Variable	Short Put Profit
actual	196.65	actual	-267.60	actual	24.37	actual	-60.10
LC_sd5	458.46	SC_sd5	-534.41	LP_sd5	171.94	SP_sd5	-207.62
LC_sd6	475.17	SC_sd6	-551.12	LP_sd6	162.44	SP_sd6	-194.93
LC_rs4	502.85	SC_rs4	-578.80	LP_rs4	328.29	SP_rs4	-379.93
LC_gk4	505.37	SC_gk4	-583.82	LP_gk4	303.01	SP_gk4	-354.65
LC_sd4	523.13	SC_sd4	-604.08	LP_sd4	189.04	SP_sd4	-227.94
LC_gk3	523.18	SC_gk3	-601.63	LP_gk3	329.75	SP_gk3	-375.03
LC_gk5	524.90	SC_gk5	-600.85	LP_gk5	243.90	SP_gk5	-292.31
LC_rs5	527.92	SC_rs5	-606.37	LP_rs5	266.75	SP_rs5	-318.36
LC_yz4	530.47	SC_yz4	-606.42	LP_yz4	339.64	SP_yz4	-394.45
LC_rs3	532.86	SC_rs3	-611.31	LP_rs3	364.53	SP_rs3	-412.97
LC_gk6	536.57	SC_gk6	-615.02	LP_gk6	245.49	SP_gk6	-290.74
LC_gk2	546.44	SC_gk2	-622.39	LP_gk2	309.70	SP_gk2	-351.80
LC_yz3	546.70	SC_yz3	-625.15	LP_yz3	364.62	SP_yz3	-419.43
LC_rs6	546.98	SC_rs6	-625.43	LP_rs6	267.71	SP_rs6	-322.51
LC_yz5	547.31	SC_yz5	-625.76	LP_yz5	305.89	SP_yz5	-363.87
LC_sd3	552.68	SC_sd3	-633.63	LP_sd3	239.17	SP_sd3	-284.47
LC_hl4	559.15	SC_hl4	-637.60	LP_hl4	341.59	SP_hl4	-390.06
LC_yz2	559.41	SC_yz2	-637.86	LP_yz2	317.78	SP_yz2	-366.25
LC_hl6	563.18	SC_hl6	-641.63	LP_hl6	303.14	SP_hl6	-354.81
LC_rs2	566.19	SC_rs2	-644.64	LP_rs2	336.28	SP_rs2	-378.38
LC_hl5	566.60	SC_hl5	-642.55	LP_hl5	277.54	SP_hl5	-326.00
LC_yz6	570.43	SC_yz6	-648.88	LP_yz6	310.55	SP_yz6	-368.52
LC_hl3	582.54	SC_hl3	-660.99	LP_hl3	369.10	SP_hl3	-417.57
LC_hl2	587.46	SC_hl2	-665.91	LP_hl2	359.25	SP_hl2	-401.35
LC_yz1	627.53	SC_yz1	-705.98	LP_yz1	358.88	SP_yz1	-404.16
LC_yz1	627.53	SC_yz1	-705.98	LP_yz1	358.88	SP_yz1	-404.16
LC_rs1	669.46	SC_rs1	-750.41	LP_rs1	425.55	SP_rs1	-477.27
LC_gk1	676.11	SC_gk1	-754.56	LP_gk1	333.02	SP_gk1	-378.31
LC_hl1	721.03	SC_hl1	-799.48	LP_hl1	353.50	SP_hl1	-401.99
LC_sd2	797.20	SC_sd2	-873.15	LP_sd2	524.36	SP_sd2	-579.26
LC_sd1	867.46	SC_sd1	-948.41	LP_sd1	400.67	SP_sd1	-449.24

Sorted on Long Call

Table A6 **Nonmember** EMC Total Net Profits or Losses ($): Actual vs. Black-model over 51 Days

Variable	Long Call Profit	Variable	Short Call Profit	Variable	long Put Profit	Variable	Short Put Profit
actual	87.50	actual	-389.25	actual	-58.25	actual	-170.50
LC_sd5	339.77	SC_sd5	-704.02	LP_sd5	90.94	SP_sd5	-348.52
LC_sd6	356.12	SC_sd6	-720.37	LP_sd6	83.18	SP_sd6	-323.86
LC_rs4	383.17	SC_rs4	-747.42	LP_rs4	187.42	SP_rs4	-572.30
LC_gk4	385.67	SC_gk4	-766.46	LP_gk4	170.03	SP_gk4	-547.51
LC_sd4	389.13	SC_sd4	-799.45	LP_sd4	104.82	SP_sd4	-382.22
LC_gk3	400.66	SC_gk3	-783.94	LP_gk3	208.75	SP_gk3	-555.70
LC_rs3	403.10	SC_rs3	-792.35	LP_rs3	234.76	SP_rs3	-590.89
LC_gk5	404.87	SC_gk5	-784.23	LP_gk5	137.09	SP_gk5	-472.13
LC_rs5	405.51	SC_rs5	-788.57	LP_rs5	147.53	SP_rs5	-542.69
LC_gk6	407.98	SC_gk6	-797.12	LP_gk6	133.08	SP_gk6	-519.61
LC_yz4	410.30	SC_yz4	-774.55	LP_yz4	198.14	SP_yz4	-599.86
LC_yz3	416.73	SC_yz3	-805.98	LP_yz3	231.21	SP_yz3	-624.30
LC_rs6	418.05	SC_rs6	-807.30	LP_rs6	137.31	SP_rs6	-545.17
LC_sd3	420.41	SC_sd3	-827.98	LP_sd3	131.82	SP_sd3	-464.01
LC_gk2	425.79	SC_gk2	-790.04	LP_gk2	196.10	SP_gk2	-504.01
LC_yz5	426.66	SC_yz5	-807.58	LP_yz5	165.10	SP_yz5	-582.85
LC_hl4	429.95	SC_hl4	-819.20	LP_hl4	209.56	SP_hl4	-584.92
LC_yz2	437.37	SC_yz2	-818.32	LP_yz2	198.35	SP_yz2	-575.70
LC_hl6	439.73	SC_hl6	-823.21	LP_hl6	170.60	SP_hl6	-547.68
LC_rs2	439.78	SC_rs2	-824.75	LP_rs2	222.14	SP_rs2	-545.27
LC_yz6	441.05	SC_yz6	-830.30	LP_yz6	163.65	SP_yz6	-602.06
LC_hl5	445.77	SC_hl5	-810.02	LP_hl5	154.90	SP_hl5	-521.77
LC_hl3	452.92	SC_hl3	-842.17	LP_hl3	243.18	SP_hl3	-595.67
LC_hl2	457.58	SC_hl2	-846.83	LP_hl2	244.62	SP_hl2	-552.52
LC_yz1	496.84	SC_yz1	-886.09	LP_yz1	236.57	SP_yz1	-597.77
LC_yz1	496.84	SC_yz1	-886.09	LP_yz1	236.57	SP_yz1	-597.77
LC_rs1	533.25	SC_rs1	-955.05	LP_rs1	294.85	SP_rs1	-664.08
LC_gk1	544.38	SC_gk1	-933.63	LP_gk1	209.39	SP_gk1	-542.98
LC_hl1	588.35	SC_hl1	-977.60	LP_hl1	226.77	SP_hl1	-580.06
LC_sd2	666.34	SC_sd2	-1030.59	LP_sd2	377.41	SP_sd2	-776.07
LC_sd1	720.64	SC_sd1	-1134.89	LP_sd1	279.99	SP_sd1	-620.80

Sorted on Long Call

We now do the same for the more important TABO strategy. **Table A7** reports the Total Gross Profit, Total Initial Trading Cost, Exercise Cost, and Net Profit by Membership Type Who Used the TABO Strategy During the 51 Hoffman Days in $/5,000-bushel Contract. We compare observed profits and losses with those derived from simulated Black prices for Members (**Table A8**) then Non-Members (**Table A9**).

Table A7. Maximum Gross Profit, Total Initial Trading Cost, Exercise Cost, and Net Profit by Membership Type Who Used the TABO Strategy During the 51 Hoffman Days

Option Position	Maximum Gross Profit	Total Initial Receipt or Payment Including Premium	Total Exercise Cost	Total Transactions Cost Excluding Premium	Net Profit
Members					
Long Puts	537.5	-260.1	-27.19	-32.29	250.21
Long Calls	756.25	-298.35	-13.75	-57.1	444.15
Nonmembers					
Long Puts	500	-280.5	-131.92	-157.42	87.58
Long Calls	731.25	-318.75	-112.5	-176.25	300

Table A8 **Member** TABO Total Net Profits or Losses ($) for Actual vs. Black-model over 51 Days

Variable	Long Call Profit	Variable	Short Call Profit	Variable	Long Put Profit	Variable	Short Put Profit
actual	444.15	actual	-520.10	actual	250.21	actual	-305.10
LC_sd5	856.95	SC_sd5	-955.40	LP_sd5	644.94	SP_sd5	-718.97
LC_sd6	859.38	SC_sd6	-947.83	LP_sd6	624.74	SP_sd6	-698.77
LC_gk5	943.16	SC_gk5	-1039.11	LP_gk5	789.88	SP_gk5	-879.85
LC_gk4	946.26	SC_gk4	-1039.71	LP_gk4	842.46	SP_gk4	-932.43
LC_rs4	949.03	SC_rs4	-1037.48	LP_rs4	901.55	SP_rs4	-994.72
LC_rs5	954.10	SC_rs5	-1047.55	LP_rs5	849.32	SP_rs5	-945.68
LC_gk3	973.70	SC_gk3	-1067.15	LP_gk3	852.42	SP_gk3	-939.21
LC_sd4	973.96	SC_sd4	-1072.41	LP_sd4	714.55	SP_sd4	-788.62
LC_gk6	974.65	SC_gk6	-1068.10	LP_gk6	809.81	SP_gk6	-899.77
LC_rs6	980.77	SC_rs6	-1074.22	LP_rs6	853.73	SP_rs6	-946.90
LC_yz4	983.56	SC_yz4	-1072.01	LP_yz4	936.59	SP_yz4	-1029.76
LC_rs3	986.78	SC_rs3	-1077.73	LP_rs3	913.07	SP_rs3	-999.86
LC_hl5	987.26	SC_hl5	-1083.21	LP_hl5	829.92	SP_hl5	-923.11
LC_yz5	990.13	SC_yz5	-1083.58	LP_yz5	897.58	SP_yz5	-993.95
LC_hl4	999.51	SC_hl4	-1097.96	LP_hl4	889.21	SP_hl4	-979.18
LC_gk2	1000.46	SC_gk2	-1096.41	LP_gk2	844.48	SP_gk2	-921.69
LC_yz3	1005.89	SC_yz3	-1096.84	LP_yz3	937.11	SP_yz3	-1027.08
LC_hl6	1008.48	SC_hl6	-1101.93	LP_hl6	860.19	SP_hl6	-946.96
LC_rs2	1015.77	SC_rs2	-1106.72	LP_rs2	923.94	SP_rs2	-1007.52
LC_yz2	1017.43	SC_yz2	-1110.88	LP_yz2	925.76	SP_yz2	-1015.73
LC_hl3	1019.44	SC_hl3	-1120.39	LP_hl3	898.75	SP_hl3	-982.38
LC_yz6	1019.64	SC_yz6	-1115.59	LP_yz6	897.65	SP_yz6	-990.82
LC_hl2	1054.97	SC_hl2	-1155.92	LP_hl2	899.56	SP_hl2	-983.18
LC_sd3	1104.33	SC_sd3	-1202.78	LP_sd3	809.01	SP_sd3	-895.84
LC_gk1	1111.81	SC_gk1	-1207.76	LP_gk1	863.65	SP_gk1	-944.07
LC_hl1	1127.84	SC_hl1	-1223.79	LP_hl1	917.45	SP_hl1	-994.68
LC_yz1	1131.11	SC_yz1	-1227.06	LP_yz1	895.32	SP_yz1	-978.94
LC_yz1	1131.11	SC_yz1	-1227.06	LP_yz1	895.32	SP_yz1	-978.94
LC_rs1	1209.43	SC_rs1	-1305.38	LP_rs1	995.62	SP_rs1	-1085.64
LC_sd2	1355.82	SC_sd2	-1459.27	LP_sd2	1140.83	SP_sd2	-1227.69
LC_sd1	1390.42	SC_sd1	-1488.87	LP_sd1	1013.15	SP_sd1	-1084.10

Sorted on Long Call

Table A9 **Nonmember** TABO Total Net Profits or Losses ($) for Actual vs. Black-model over 51 Days

Variable	Long Call Profit	Variable	Short Call Profit	Variable	long Put Profit	Variable	Short Put Profit
actual	300.00	actual	-664.25	actual	87.58	actual	-508.00
LC_sd6	1422.35	SC_sd6	-2307.42	LP_sd6	1303.07	SP_sd6	-2163.44
LC_sd5	1472.09	SC_sd5	-2373.70	LP_sd5	1305.65	SP_sd5	-2171.42
LC_gk5	1568.10	SC_gk5	-2530.57	LP_gk5	1525.86	SP_gk5	-2513.32
LC_sd4	1569.83	SC_sd4	-2408.14	LP_sd4	1342.32	SP_sd4	-2249.02
LC_gk4	1572.23	SC_gk4	-2527.24	LP_gk4	1547.94	SP_gk4	-2512.81
LC_gk6	1580.50	SC_gk6	-2522.32	LP_gk6	1533.57	SP_gk6	-2502.79
LC_rs4	1585.11	SC_rs4	-2561.52	LP_rs4	1603.86	SP_rs4	-2598.65
LC_rs5	1593.45	SC_rs5	-2539.21	LP_rs5	1580.01	SP_rs5	-2562.48
LC_sd3	1594.54	SC_sd3	-2436.28	LP_sd3	1390.15	SP_sd3	-2344.64
LC_hl5	1599.87	SC_hl5	-2566.62	LP_hl5	1562.42	SP_hl5	-2536.51
LC_gk3	1600.06	SC_gk3	-2552.01	LP_gk3	1529.82	SP_gk3	-2514.10
LC_hl6	1600.45	SC_hl6	-2564.17	LP_hl6	1576.96	SP_hl6	-2561.36
LC_rs6	1608.37	SC_rs6	-2551.01	LP_rs6	1571.36	SP_rs6	-2542.67
LC_yz4	1616.36	SC_yz4	-2599.81	LP_yz4	1624.48	SP_yz4	-2631.21
LC_hl4	1618.75	SC_hl4	-2575.54	LP_hl4	1595.61	SP_hl4	-2558.99
LC_yz5	1622.44	SC_yz5	-2597.58	LP_yz5	1611.80	SP_yz5	-2616.85
LC_rs3	1623.23	SC_rs3	-2596.70	LP_rs3	1607.10	SP_rs3	-2618.16
LC_gk2	1629.31	SC_gk2	-2539.21	LP_gk2	1541.19	SP_gk2	-2510.62
LC_yz3	1634.30	SC_yz3	-2602.56	LP_yz3	1618.01	SP_yz3	-2654.50
LC_yz6	1644.26	SC_yz6	-2604.88	LP_yz6	1604.95	SP_yz6	-2623.33
LC_yz2	1645.54	SC_yz2	-2610.58	LP_yz2	1621.15	SP_yz2	-2632.71
LC_hl3	1646.16	SC_hl3	-2603.41	LP_hl3	1578.76	SP_hl3	-2500.83
LC_rs2	1651.06	SC_rs2	-2627.98	LP_rs2	1625.45	SP_rs2	-2642.39
LC_hl2	1668.03	SC_hl2	-2546.84	LP_hl2	1575.65	SP_hl2	-2516.63
LC_yz1	1671.02	SC_yz1	-2614.82	LP_yz1	1532.52	SP_yz1	-2533.73
LC_yz1	1671.02	SC_yz1	-2614.82	LP_yz1	1532.52	SP_yz1	-2533.73
LC_gk1	1699.92	SC_gk1	-2579.33	LP_gk1	1471.69	SP_gk1	-2448.11
LC_hl1	1708.61	SC_hl1	-2626.67	LP_hl1	1496.66	SP_hl1	-2463.96
LC_sd2	1713.62	SC_sd2	-2502.55	LP_sd2	1554.29	SP_sd2	-2404.18
LC_rs1	1719.95	SC_rs1	-2682.77	LP_rs1	1590.85	SP_rs1	-2626.42
LC_sd1	1736.87	SC_sd1	-2545.49	LP_sd1	1385.33	SP_sd1	-2239.24

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