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Why millers prefer to hedge at the KCBoT and grain elevator operators at the CBoT

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Abstract

In this paper, we analyze why grain elevator operators tend to hedge hard red winter wheat at the CBoT and not at the KCBOT. They do so because they trade not only the basis but also the premium risk. Like the basis, also premiums of hard red winter wheat have a tendency to increase after harvest. Only a short hedge in the lower priced CBoT wheat contract makes it possible to participate in a post-harvest premium increase. For this reason, grain elevator operators favor a loose hedge at the CBoT. Our results underscore the importance of premium risk for hedging decisions.

Keywords: Wheat, hedging, millers, grain elevator operators, Kansas City Board of Trade, Chicago Board of Trade

1 Introduction

In his seminal paper “Whose Markets? Evidence on Some Aspects of Futures Trading” (Journal of Marketing, Vol. 19, No. 1, pp. 1—11) Working hints to a tendency at US wheat markets that is still intact today: Millers of hard red winter wheat prefer to hedge at the Kansas City Board of Trade (KCBOT) while many grain elevator operators prefer the Chicago Board of Trade (CBoT). This is an interesting observation since one would have expected that also grain elevator operators favor for hard red winter wheat hedging a close hedge at the KCBOT. Yet, the opposite is the case.¹

According to Working (1954), this tendency is based on the fact that the Chicago soft red winter wheat contract is deliverable by different wheat classes.² The latter creates a sort of bias in favor of short hedgers (i.e., grain elevator operators) and against long hedgers (i.e., millers). This is why, grain elevator operators as traditional short hedgers prefer a loose hedge at the CBoT to a close hedge at the KCBOT. Because neither Working nor someone else has ever elaborated further on this issue, we will do so in this paper. We will clarify what Working (probably) had in mind when he stated that “multiplicity of deliverable classes of a commodity, as for Chicago wheat, creates a sort of bias in favor of hedgers of stocks (short hedgers) and against hedgers of forward orders (long hedgers),” (p.7).

We will show that the Chicago soft red winter wheat contract usually tracks the lowest priced wheat in the United States (Garbade & Silber, 1983) and that premiums of high protein wheat (i.e., hard red winter and spring wheat) have a tendency to increase from spring to fall are the real reasons why grain elevator operators tend to hedge hard red winter wheat at the CBoT. Only a short hedge at the CBoT makes it possible to participate in a premium increase from spring to fall. For grain elevator operators, the latter is appealing because it promises additional profits. In the end, what the operators of grain elevators are doing is that they trade not only the basis but also the premium risk.

On the other hand, millers of hard red winter wheat deliberately refrain from trading the premium risk. For them, there is no way to participate in a premium increase. On the contrary, a long hedge at

¹ If not otherwise stated, here, and in the following, the notation miller will always refer to a hard red winter wheat miller and grain elevator operator to a grain elevator operator trading hard red winter wheat.

² For details see the CBoT rulebook, chapter 14, rule 14104 (CBoT, 2016).

the CBoT can even cause an additional loss. Therefore, millers favor a close hedge at the KCBOT that eliminates (or at least minimizes) any premium risk (Moore, 1950).

We contribute to the existing literature on futures trading³. Our findings reveal whenever different classes and grades for a commodity, as for U.S. wheat, exist and there is uncertainty about the future availability of higher grades, short hedgers have an incentive to trade the basis and the premium risk, whereas long hedgers try to hedge the premium risk. For this reason, short hedgers favor futures with a large exposure to premium risk and long hedgers favor a low exposure. The latter explains the tendency of millers to hedge at the KCBOT and of grain elevator operators at the CBoT.

In addition, our findings relativize the importance of liquidity of futures markets for hedging decisions. It was not the liquidity that brought the grain elevator operators to hedge at the CBoT but it was the possibility to trade the premium risk. The liquidity of the CBoT only developed as a consequence of the increased market engagement of grain elevator operators and it is now an additional advantage of the CBoT. Yet, liquidity has never been the main reason for the increased market engagement of grain handlers (e.g., the Australian Wheat Board) at the CBoT as has been suggested many times (e.g., Bond et al., 1985; Sheales & Tomek, 1987).

To our knowledge, this is the first paper highlighting the importance of premium risk for grain merchandising. So far, premium risk has been neglected. This, however, is not justified. Premium risk is actively traded by grain elevator operators and it influences the choice of an appropriate futures market for hedging. Beside the basis and spreads, premium risk is the third important determinant of grain merchandising.

The remainder of the paper is organized as follows. First, we revisit Working's paper and elaborate on his findings. Based on this, we provide a reinterpretation for Working's observation that millers tend to hedge at the KCBOT and grain elevator operators at the CBoT. The final section concludes.

2 A revisit of Working's paper

At the time, Working was writing his paper, it was already a well-known fact that millers tend to hedge hard red winter wheat at the KCBOT and grain elevator operators at the CBoT. The events at the U.S. wheat market after the election of Herbert Hoover as U.S. president had clearly revealed this fact.

Herbert Hoover had been elected as President of the United States in 1928. Contrary to his predecessor Calvin Coolidge, Hoover was a strong advocate of federal farm interventions. Already in his acceptance speech, Hoover had expressed his willingness to increase the income of farmers. To achieve this aim, Hoover created the Federal Farm Board in July 1929. The Farm Board immediately set to work and decided that the best way to boost the income of farmers would be to corner the world market and drive up prices. Therefore, in a first step the Farm Board pressured the federal credit banks to liberalize their loans to agricultural cooperatives. The cooperatives, in return, should make more generous loans to farmers, so that farmers could hold their wheat off the market. In a next step, the Farm Board set up a state-owned enterprise—the Grain Stabilization Corporation—to accumulate own wheat stocks (Bovard, 2006). The first wheat was bought in February 1930.

At first, it seemed that the strategy of the Farm Board could work out: The massive buyout of wheat by the Grain Stabilization Corporation in 1930 boosted the U.S. wheat price to 18 cents per bushel above the world market price, which again led to the collapse of U.S. wheat exports. The Farm Board was confident that a world shortage of wheat was imminent and finally the world market price would go up. Yet, the opposite happened. The market already priced in the large carryover of the Grain Stabilization Corporation being convinced that the Farm Board would eventually dump its surpluses

³ For a literature review see Garcia & Leuthold (2004).

on the market. In the end, the Farm Board policy even further depressed the world market price. The prices only recovered after the Farm Board had resold all its wheat stocks in 1933 (Bovard, 2006).⁴

Working was interested in another aspect of the Farm Board policy: The impact of the policy on wheat futures markets. As expected, the intervention in the storage market had adverse effects in particular for operators of grain elevators whose stocks sharply decreased. The former were not anymore able to compete with the Grain Stabilization Corporation whose sole purpose was to bid up prices. Because of that the grain elevator operators had lost most of their warehousing business to the Grain Stabilization Corporation. On the other hand, millers were only marginally affected by the Farm Board policy. They usually only keep smaller wheat stocks, just enough to keep their mills running for a couple of months (Working, 1953a).

<< Figure 1 here >>

Against expectations, the Farm Board policy had a much stronger impact on the CBoT than on the KCBOT (cp. figure 1). At the CBoT, the number of open interests declined much more than the KCBOT number. During 1929/30 and 1930/31, the number of open interests at the CBoT halved despite a strong increase in carryovers in the United States and worldwide (Working, 1953a). For Working, this was a clear hint that the CBoT wheat futures is primarily used by grain elevator operators and the KCBOT wheat futures by millers.

Working's statement is based on the observation that there is a positive correlation between the number of open interests and hedging needs at a futures market: The larger the hedging need is, the larger is the number of open interests at the futures market, and vice versa (Working, 1953b). Because the stocks of grain elevator operators declined more than those of millers, also their hedging need must have declined more. Accordingly, the declining number of open interests at the CBoT indicates that the CBoT is primarily used by grain elevator operators. The relatively stable numbers at the KCBOT in return indicate that the KCBOT is primarily used by millers whose hedging needs only marginally changed.

Working's contribution to science is that he provided an explanation for the diverging hedging behavior of millers and grain elevator operators. The solution came to Working's mind when he analyzed the convergence problems at the KCBOT in 1953/54.

In order to better understand the convergence problems of 1953/54, one has to go back fifteen years in time until 1938. After a series of larger crops, the U.S. was once again faced with a burdensome surplus of wheat. Despite the disastrous experience with the Farm Board in 1930, the new president Franklin D. Roosevelt saw no alternative than a renewed intervention in the wheat market. Yet, the newly founded Commodity Credit Corporation followed a slightly different policy than its predecessor—the Federal Farm Board. Contrary to the Farm Board, the Commodity Credit Corporation followed a floor price policy: Whenever the market price fell below a pre-specified floor price, the Commodity Credit Corporation bought additional wheat on the market to stabilize the market price. And, when the prices recovered the Commodity Credit Corporation resold at least parts of the wheat on the market. Eventually, the floor price policy led to a market price that fluctuated in a very narrow range around the floor price (Moore, 1950).

As before, the Commodity Credit Corporation had adverse effects on grain elevator operators. More importantly, this time also smaller country mills were affected. Usually, country mills, located in the heartland of U.S. wheat production, bought larger parts of their wheat at harvest time when prices were traditionally lower due to harvest pressure. Yet, because of the floor price policy of the Commodity Credit Corporation in 1938 and the following years the prices did not make their seasonal lows at harvest time. For country millers, this meant that they could not cover their wheat needs at

⁴ More details on the Farm Board and its policy measures are provided by Peck (1976).

harvest, but had to buy their wheat just in time on the market.⁵ The latter significantly influenced the hedging behavior of millers, which declined with the lower stocks (Moore, 1950).

For the KCBOT, the new situation constituted a serious threat, since it further lowered the already low liquidity of the KCBOT wheat futures. The KCBOT wheat futures was at risk to lose the necessary liquidity to guarantee the effectiveness of hedging. In order to improve the liquidity, the board of the KCBOT decided in 1940 to adapt the contract specifications of the KCBOT wheat futures: The delivery of both hard red winter and soft red winter wheat should be permitted.

At first, the changes of the contract specifications had no real impact. The KCBOT wheat futures tracked as usual the price of the locally grown hard red winter wheat. The protein premiums for hard red winter wheat were not so large that a transport of lower priced soft red winter wheat from further away locations in the East to delivery silos near Kansas City had made any sense; the higher return on sales had not covered the additional transportation costs. Yet, the situation changed in 1953.

In 1953, the traditionally strong price relation between hard red winter and soft red winter wheat began to weaken. Two large crops in 1952 and 1953 had flooded the market with soft red winter wheat (Dominion Bureau of Statistics, 1955). Because the application of soft red winter wheat is rather limited, its flour is only suited for baking biscuits, pastries, and cakes, the price of soft red winter wheat relatively declined compared to the hard red winter wheat price. Ultimately, the price gap became so large that it was more profitable to deliver the KCBOT wheat futures with soft red winter wheat instead of hard red winter wheat. As a consequence, the KCBOT wheat futures did not anymore converge against the hard red winter wheat price but against the soft red winter wheat price. Moreover, the corresponding downward shift in the convergence strengthened the basis which again disfavored long hedgers (i.e., millers) and favored short hedgers (i.e., grain elevator operators).

In particular, the millers of hard red winter wheat were very dissatisfied with the situation and pressured the KCBOT to reestablish the original contract specifications of 1940. Although, the millers did not succeed in their request, they could at least convince the KCBOT board to launch a new futures contract that only allowed the delivery of hard red winter wheat. The new contract was a real success story, not only that it absorbed all the liquidity of the old contract within a year, but also it regained most of the hedging business that the KCBOT had lost to the CBoT during 1953/54 due to the convergence problems. The fast recovery of the new *old* KCBOT hard red winter wheat contract clearly demonstrated that the KCBOT owes its existence to the fact that it is a pure hard red winter wheat contract.

For Working, the convergence problems revealed an additional insight, namely that short hedgers of hard red winter wheat can make an additional profit from hedging, when the corresponding futures contract permits the delivery of different wheat classes and the futures price converges against the lower priced soft red winter wheat. Because both conditions are usually met at the CBoT, for Working this was the explanation why grain elevator operators prefer a loose hedge at the CBoT to a close hedge at the KCBOT.

3 A reinterpretation of Working's observation

However, so convincing Working's explanation looks at first glance, there are still some shortcomings. For instance, the possibility to deliver the CBoT wheat contract by different wheat classes guarantees by no means that short hedgers always gain. Quite the opposite, if the soft red

⁵ To be more precise, the floor price policy of the Commodity Credit Corporation led to a reversion of the market structure. The market structure switched from a carry market that honors storage, to a flat or inverse market that penalizes storage (Moore, 1950). The just in time purchases of country millers were only the logical consequence of the reversed market structure.

winter wheat price relatively outperforms the hard red winter wheat price, then short hedgers have to incur an additional loss from hedging at the CBoT, even if the soft red winter wheat price is still the lowest priced wheat in the United States. Short hedgers only make an additional profit from hedging at the CBoT, if the hard red winter wheat price relatively outperforms the soft red winter wheat price. Only in this case, short hedgers have an advantage from hedging at the CBoT.

Evidently, Working's explanation alone cannot be the full answer. There must be something else that brings grain elevator operators to hedge at the CBoT. And, indeed, the answer was already given by Allen Q. Moore (1950)—Vice President Pillsbury Mills, Inc.—in 1950. Moore was talking about the disadvantages millers had recently to bear since the Commodity Credit Corporation (or its floor price policy) had forced so many millers to do their hedging business at the CBoT. Moore claimed:

'Even though both winter and spring types, as well as soft, are deliverable in Chicago it has increased risk to the miller both because it reduced the proximity of the market to the miller, thus reducing his chances of making or taking delivery and forced him to hedge premium hard winter and spring milling types in the Chicago contract which is now fundamentally a soft wheat contract. In effect, this is more of a spread than a hedge. The futures market price movements thus did not as closely correspond with the cash wheat price movements which increased the premium risk of the miller on his cash wheat or flour hedge,' (p.69).

In particular, the last sentence is very revealing since it clarifies why millers like Moore prefer for hard red winter wheat hedging the KCBOT to the CBoT. The millers spare the premium risk that a CBoT hedge would bring with it. This raises the question what so specific is about the premium risk that millers try to hedge it and grain elevator operators voluntarily opt to trade it. An answer to this question will also answer our original question why millers tend to hedge hard red winter wheat at the KCBOT and grain elevator operators at the CBoT.

The first part of the question is easily be answered. One only has to examine the seasonal pattern of hard red winter and spring wheat premiums. Because forward cash prices are usually not available, we will focus on intermarket spreads as a proxy for the premiums. Intermarket spreads should be a fairly reasonable proxy, since futures and cash prices follow a common trend. In fact, also futures market participants take the CBoT/KCBOT (short CBoT/long KCBOT) spread as an indicator for the premium. Because, we are particularly interested in seasonal pattern, we will focus on spread changes. The corresponding data are presented in table 1.

<< Table 1 here >>

An examination of the changes of the CBoT/KCBOT (or CBoT/MGEX) spread from March to October—typical forward selling and delivery dates of wheat—over a time period of sixteen years from 2000/01 to 2015/16 indicates that there is a tendency of hard red winter and spring wheat premiums to increase from spring to fall. The data show that hard red winter wheat premiums increased on average 9 cent per bushel, and those of hard red spring wheat 10 cent per bushel (cp. table 1).

One might be attempted to regard this tendency as noise, yet this would not reflect the reality. Actually, without the tendency of increasing protein premiums, the KCBOT wheat contract would have collapsed long ago. The tendency of increasing protein premiums and thus expectable price movements were the major motivation for spread traders to transfer for the survival of the KCBOT necessary short speculation to the CBoT. Without this transfer of short speculation to the CBoT the KCBOT wheat contract had not been liquid enough to guarantee the effectiveness of long hedging. The hedging costs of millers had become so high that the latter had to leave the KCBOT (Gray, 1979). However, thanks to the tendency of increasing protein premiums and thus profitable spread trading this situation never happened.

Furthermore, it would be false to regard the tendency of increasing protein premiums as a sign of market inefficiency. In fact, the opposite is the case. The reason why the premiums of hard red winter

and spring wheat have a tendency to increase from spring to fall is the different climate in the Great Plains—the main production area of hard red winter wheat—and east of the Mississippi River—the main production area of soft red winter wheat. In particular, the harder climate in the Great Plains increases the probability of droughts and thus short crops. Weather induced price increases are more likely in hard red winter wheat regions than in soft red winter wheat regions. Accordingly, the tendency of increasing premiums of hard red winter and spring wheat is rather a sign of market efficiency than market inefficiency.

This brings us to our next question: why do grain elevator operators profit from a premium increase and millers do not? Two things are responsible for this. The first is related to the relationship of the basis and the premium, and the second to the futures position a hedger takes up.

As is well known, the basis is defined as the difference between the cash price and the futures price (i.e., basis = cash price – futures price). In the actual case, the cash price corresponds to the hard red winter wheat price and the futures price to the CBoT soft red winter wheat price. A premium increase then implies a relative price increase of the hard red winter wheat price compared to the soft red winter wheat price, which in turn implies a stronger basis.

A stronger basis, however, favors short hedgers and disfavors long hedgers. A short hedger profits from a premium increase, since his trading strategy requires to buy a weak basis and to resell a stronger basis. The corresponding profit margin then equals the difference between both bases, the weaker buy basis and the stronger sell basis. Because a premium increase further strengthens the sell basis, any premium increase provides an additional profit of the size of the premium increase for the short hedger.

A long hedger again cannot profit from a premium increase. His trading strategy requires to sell a strong basis and to buy back a weaker basis. Because in this context a premium increase implies a strengthening of the buy basis, the profit margin of a long hedger is lowered by the size of the premium increase. Accordingly, only a short hedger can profit from a premium increase.

The previous discussion can also be illustrated by means of a basis transaction (see below).

	<u>Cash</u>		<u>Futures</u>		
	buy	sell	long	short	
Buy basis	400			400	0
Sell basis		409	400		9
					9

The example depicts a short hedge of hard red winter wheat at the CBoT. Ceteris paribus, a premium increase then implies a relative price increase of the hard red winter wheat price—the cash price position—compared to the CBoT soft red winter wheat price—the futures price position. In accordance with table 1, the hard red winter wheat price might increase 9 cent per bushel compared to the futures position. The corresponding stronger sell basis then leads to an increase of the profit margin of 9 cent per bushel. Again, the increase of the profit margin equals exactly the increase of the premium, namely 9 cent per bushel. The example reconfirms the previous statement that short hedgers are the profiteers of a premium increase.

The former, however, brings up another question: When the tendency of increasing protein premiums provides for additional profits for short hedgers why then not all grain elevator operators hedge hard red winter wheat at the CBoT, but a significant amount of short hedging is still done at the KCBOT?

Again, the answer to this question is provided by table 1. Table 1 indicates that it is more risky to trade the premium than the basis; while, the basis usually follows a seasonal upward trend, protein premiums do not have this strong seasonal tendency. In fact, it depends on the local weather and/or export conditions whether or not the premiums increase from spring to fall. Only when hard red winter and spring wheat is in short supply, millers have to bid up prices to secure delivery. Otherwise, the premiums can even shrink.

Because grain elevator operators are engaged at both futures markets (Gray & Peck, 1981), the CBoT as well as the KCBOT, this indicates that not every short hedger is willing (or able) to take a higher premium risk in exchange for the possibility of an additional profit. Some grain elevator operators must be more risk-averse than others.

The former, however, only resolves the question why not all grain elevator operators are engaged at the CBoT. What is not solved is the question why so many grain elevator operators are engaged at the CBoT. Our answer to this last question would be because of the increasing protein premiums that promise an additional profit for short hedgers. But, this explanation is at odds with the standard literature (e.g., Bond et al., 1985) which regards the higher liquidity of the CBoT as the main reason for the increased market engagement of grain elevator operators at the CBoT.

Admittedly, the liquidity argument has its attraction. Liquidity and thus hedging cost have always been an issue at the KCBOT. Yet, the liquidity argument misses one important point and that is the fact that usually short speculation was missing at the KCBOT. Long hedgers (i.e., millers) regularly had severe problems to find offsetting short positions for their long hedges. Indeed, the KCBOT only owes its existence to the fact that always necessary short speculation could be transferred to the CBoT (Gray, 1979).

However, what is more important is the fact that these kind of problems are not known for short hedging at the KCBOT. Neither short hedgers had problems to find offsetting long positions for their hedges, nor was there a necessity to transfer long speculation to the CBoT to guarantee the effectiveness of short hedging. Because short hedgers have never been faced with a severe liquidity problem at the KCBOT this reduces the whole liquidity argumentation to absurdity. Short hedgers must have turned their back on the KCBOT on any other grounds.

That the liquidity argument is indeed a rather weak argument can be seen when one takes a closer look at the recent short hedging activities at the CBoT and the KCBOT (see figure 2).

<< Figure 2 here >>

Figure 2 contrasts the open contracts of short hedgers at the CBoT with that of the KCBOT. As can be seen the hedging pattern at both futures markets are quite similar with the exception that at the CBoT more short hedging is done. Yet, starting from harvest 2015 a significant amount of short hedging shifted from the CBoT to the KCBOT. Liquidity cannot explain this shift; the liquidity of the CBoT is still significantly larger than that of the KCBOT. But, the reversal in protein premiums in 2015/16 and the first half of 2016/17 can explain this shift in short hedging. The protein premiums decreased in 2015/16 59 cent/bushel (cp. table 1) and in 2016/17 at least 15 cent/bushel. These decreases imply an additional loss from short hedging at the CBoT. Accordingly, the recent events at the CBoT and the KCBOT further support our argumentation that protein premiums are important for the hedging decision of grain elevator operators.

What we have shown here is that Working's explanation for the diverging hedging behavior of millers and grain elevator operators is not complete. Working just provided the necessary condition, but not the sufficient condition. The fact that the CBoT wheat contract usually tracks the lowest-priced wheat in the United States is no guarantee that short hedgers always gain. Quite the contrary, short hedgers can even lose. Short hedgers only make an additional profit from hedging at the CBoT if the premiums of protein are increasing from spring to fall. Accordingly, we argue that seasonal increasing premiums are the sufficient condition for the diverging hedging behavior of millers and grain elevator operators.

4 Conclusions

Contrary to what is taught in textbooks, many grain elevator operators in the United States do not hedge hard red winter wheat at the KCBOT, what would be the natural choice for a close hedge, but they prefer a loose hedge at the CBoT. In this paper, we have shown that two things are responsible for this hedging behavior: The first is related to the fact that the CBoT wheat contract usually tracks the lowest priced wheat in the United States. And, the second is related to the fact that protein premiums for hard red winter and spring wheat have a tendency to increase from spring to fall. If both conditions are fulfilled then short hedgers can make an additional profit from hedging at the CBoT. In the end, what the grain elevator operators are doing is that they trade the premium risk: They buy a lower premium, and resell a higher premium.

Again, long hedgers (i.e., millers) cannot participate in a seasonal premium increase. Therefore they stay away from the CBoT and hedge the premium risk at the KCBOT.

Our paper provides new insights into the drivers of hedging behavior. In particular, our results challenge the common belief that a close hedge is always the preferred hedging strategy. A close hedge is only the preferred hedging strategy when there is no chance to trade the premium risk. Otherwise, as we have shown, a loose hedge is the better choice.

Furthermore, our results indicate that the importance of liquidity for hedging decision is overstated. Liquidity cannot explain the recent shift of short hedging at the CBoT, whereas the reversal in protein premiums can do. The latter underscores the importance of premium risk for hedging decisions. In summary it can be said that premium risk is the third important determinant of grain merchandising beside the basis and spreads.

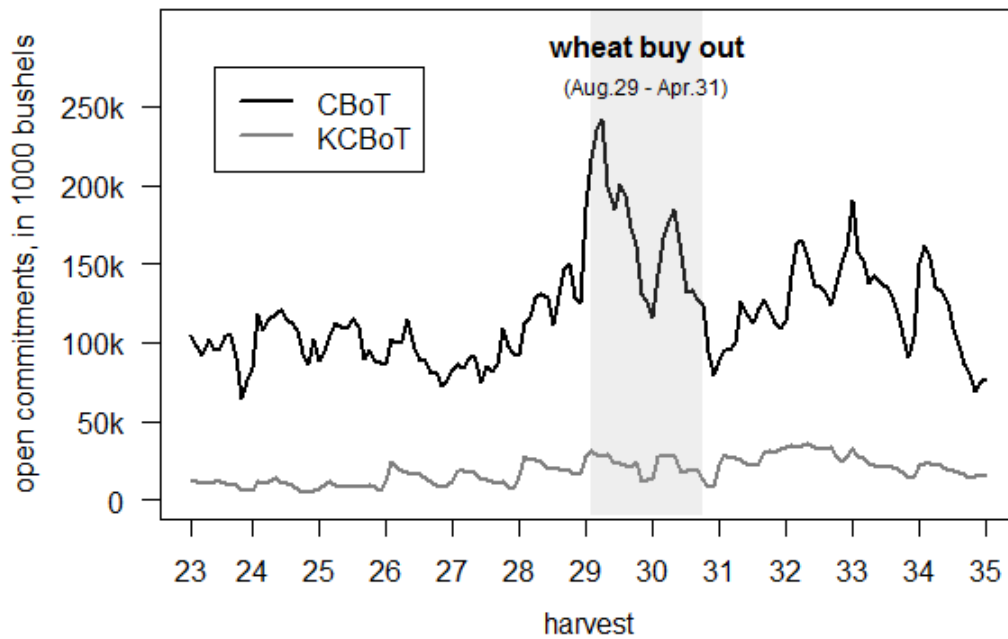
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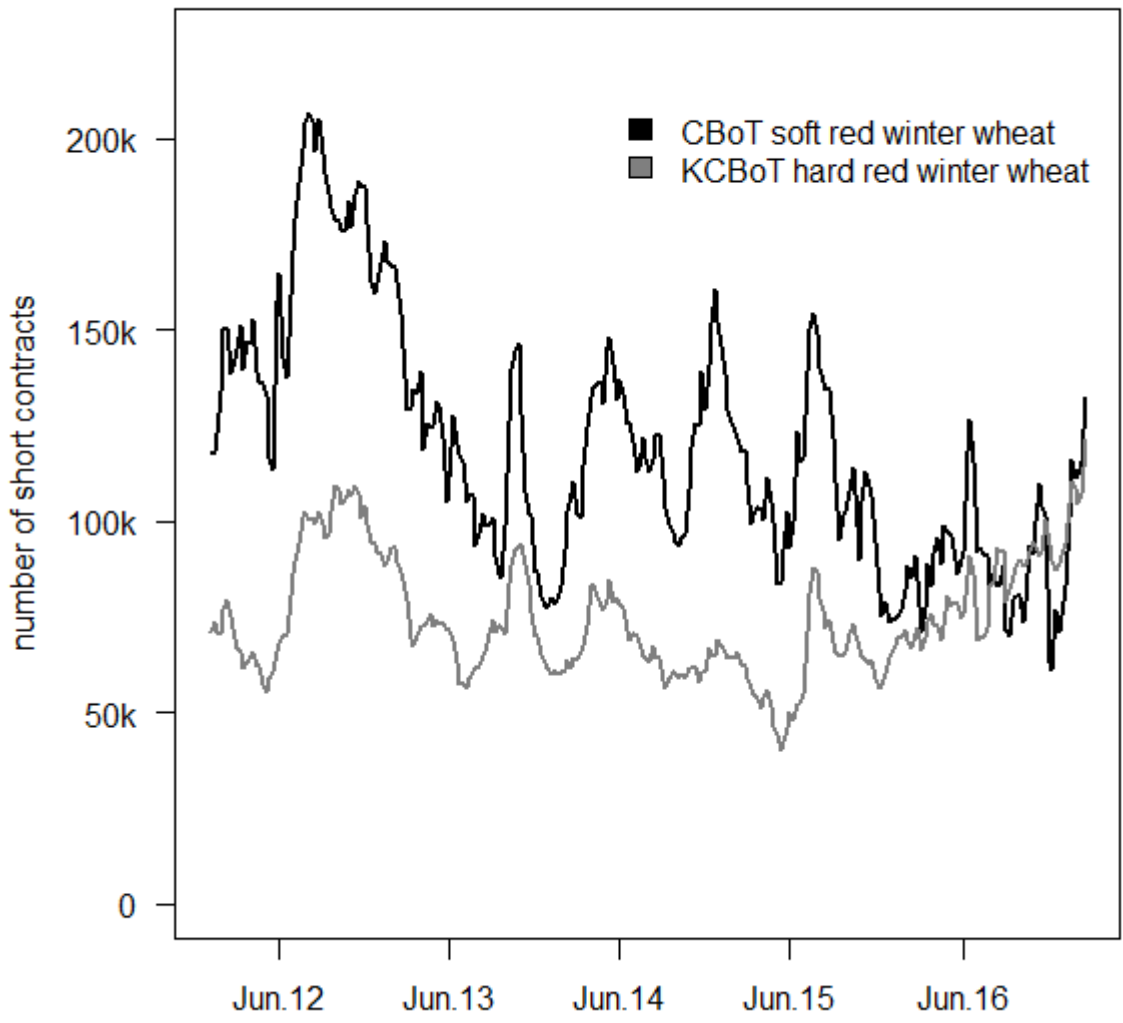
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6 Figures



Data source: USDA, Statistical Bulletin No. 31 & 41.

Figure 1: Open commitments CBoT versus KCBOT



Data source: CFTC.

Figure 2: Open contracts of short hedgers – CboT vs. KCBOT

7 Tables

Table 1: Seasonal change in premiums (March vs. October)

Crop year	CBoT Notation March	CBoT Notation October	Δ Spread CBoT/KCBoT	Δ Spread CBoT/MGEX
2000/01	298	264	30	6
2001/02	309	280	-27	-12
2002/03	301	394	70	71
2003/04	311	349	-16	-33
2004/05	403	311	20	25
2005/06	364	334	45	35
2006/07	399	500	-16	-23
2007/08	500	854	0	-17
2008/09	1092	570	-1	37
2009/10	584	499	-17	-18
2010/11	540	687	50	39
2011/12	842	627	26	111
2012/13	695	867	-4	-32
2013/14	734	689	20	-9
2014/15	700	511	21	19
2015/16	533	507	-59	-46
Average			~9	~10

Data source: HGCA.

Notes: Monthly values in cents per bushel.