PRICE RISK MANAGEMENT IN THE SUNFLOWER INDUSTRY

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I. Summary

Participants in the sunflower market are exposed to price risk greater than or equal to that of other commodities. This has important implications to sunflower processors, exporters, importers, other merchants, as well as producers; all of which are exposed to the inherent price volatility and seek means to reduce their risk. Unlike processors of other commodities, who have actively traded futures markets, participants in the sunflower markets rely on some type of cash-forward market or cross-hedging into some futures market for managing price risk. Alternatives commonly used or potentially useful for managing price risk in the sunflower market include 1) the use of some type of cash-forward market such as the Duluth FOB sunseed or the New Orleans (FOB) or Rotterdam (ex-tank) sunoil markets or 2) cross-hedging in soybeans, soybean oil, soybean meal, or other futures of related commodities. Each can be used individually or in combination with others to reduce exposure to price risk. Decisions on position taking depend on the correlation between price changes and expected changes in sunflower prices relative to the alternative market prices (i.e., the basis). Portfolio analysis is used in this study to analyze the alternatives which minimize exposure to price risk in the sunflower market. This methodology is used extensively in financial analysis and has been used in risk management analysis of other commodities. This paper describes each of the alternatives with respect to practicality and use and analyzes the effectiveness of each.

II. Introduction

One of the major sources of risk for participants in the sunflower market is that related to volatility in prices. The sunflower market reflects the larger price movements characteristic of the world oilseed complex, as well as price movements in response to its own fundamentals. Price risk appears to be somewhat greater in the sunflower market than the world oilseeds market and other markets. This is due to many factors including: variability in weather in concentrated growing regions, as opposed to more dispersed areas planted to other crops; very inelastic demands in some markets; and the lack of government programs in major producing countires. For these reasons evaluation of the efficiency of alternatives for reducing price risk for participants in the sunflower market is particularly important.

Hedging is traditionally defined as equal and opposite positions in the cash and futures markets. More generally, however, hedging would be more appropriately defined as opposite positions in more than one market, thereby allowing for use of cash forward markets, and opposite positions not necessarily equal such as in cross-hedging. The purpose of hedging is to reduce the exposure to price risk. As long as prices in the two markets are correlated, hedging can be at least partially effective because gains in one market are offset by losses in the other, though rarely would they be equally offset. Risk is not eliminated because relative prices, or basis, change through time. Consequently, price risk is reduced by heding to the extent that basis risk is less than spot price risk. Hedging typically results in

temporarily held positions in the futures or cash-forward market, which are later lifted when the cash transaction is made.

For major commodities such as wheat, corn, and soybeans, active futures markets exist and provide effective hedging opportunities. However, there is not an active futures market for sunflower, although one existed at the Minneapolis Grain Exchange temporarily but is currently inactive due to nonuse. Alternative hedging markets for sunflower merchants include use of cash forward markets and/or cross-hedging into one or more futures markets, primarily those of the soybean complex. The most active cash forward market for sunflower is the FOB Duluth market. Major terms of the contract are: quantity = 1,000 metric tons, quality is basis 40 percent oil with standardized premiums and discounts for other quality parameters; delivery exspout at a safe Duluth/Superior berth; and delivery months exist throughout the shipping season but November and May dominate. Trading in the FOB Duluth market is marginless and is facilitated by commercial brokers who receive and disseminate bids and offers. The FOB Duluth market can be used as others for traditional hedges (i.e., as a temporary substitute for a cash position), but can also be used as an attractive means to procure sunflower seeds by exporting/importing firms without originating facilities. Other cash forward markets exist for sunflower at C&F positions, as well as on sun oil, most prominent of which are FOB New Orleans and ex-tank Rotterdam; however, these are not analyzed in this study.

The other major alternative for risk reduction in the sunflower market is that of cross-hedging into one or more futures markets. In cross-hedges, futures positions need to be lifted at the time the cash transaction is made, as opposed to the alternative in the cash forward market which is conducive to making/receiving delivery. Though conceivably cross-hedges could be placed in a multitude of futures markets, those with the greatest potential are likely soybeans or soybean oil, and the effectiveness of cross-hedging depends on the correlation between price changes in the spot market and futures markets (i.e., between, for example, spot Duluth and Chicago soybean oil). If highly correlated, the cross-hedge would be effective. Cross-hedging is also used with other relatively minor crops which are highly correlated with a major commodity; examples include mill feeds, sorghum, as well as the many different qualities of wheat in which hedges can be spread across or into three different futures. Cross-hedging is potentially applicable in the soybean complex due to their high degree of interdependence and substitutability resulting in an expected high correlation in prices.

The purpose of this study is to analyze the effectiveness of hedging alternatives available to participants in the sunflower market (e.g., exporters, merchants, processors, and importers). Specific comparisons will be made comparing the effectiveness of the FOB Duluth market to cross-hedging in the soybean oil and soybean futures.[1]

III. Methods

In traditional hedges, cash positions are hedged by taking equal and opposite positions in the futures market. If there is no change in the basis, it is a

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[1]This paper is a brief summary of a more detailed report which discusses methodology and results more thoroughly, as well as presents more extensive analysis (see Wilson, 1985).

The optimal hedge ratios (HR^*) and measures of hedging effectiveness (E) for each of the markets are shown in Table 2. In the top part of that table the parameters were estimated for more aggregate time periods, whereas in the lower part they were estimated for each crop year individually. The optimal hedge ratios (HR^*) indicates the number of bushels or pounds required to cross-hedge a given cash position. For example, a hedge position in the soybean oil futures market which minimizes risk requires .335 pounds of oil for every pound of sunflwoer in the cash position (i.e., a long cash position of 500,000 lbs. requires a sale of 157,000 lbs. of oil which due to contract size would be two or three contracts, resulting in a net portion either over-or underhedged). Similarly, .0121 bushels of soybeans would be required to hedge 100 lbs. of sunseeds. In traditional hedging normally positions are equal and opposite. But in hedging spot Duluth sunflower against FOB Duluth the hedge ratio is only 0.57. The fact that this is significantly less than 1.0 indicates that there is sizeable basis risk between the spot and FOB markets. A high level of basis risk is generally associated with a low level of hedging effectiveness and low hedge ratio.

TABLE 2. OPTIMAL HEDGE RATIOS AND MEASURES OF HEDGING EFFECTIVENESS FOR HEDGING SUNFLOWER SPOT DULUTH, 1977-84, AND FOR INDIVIDUAL CROP YEARS[1]

	Hedging Market					
	Nearby Chicago Futures					
	Soybeans		Soybean Oil		Sunflower FOB Duluth	
	HR^*	E	HR^*	E	HR^*	E
1977/84	.0121	.36	.335	.45	--	--
1979-84	.0112	.32	.314	.42	.568	.37
Crop Year						
1977/78	.0227	.77	.607	.86	--	--
1978/79	.0182	.64	.357	.31	--	--
1979/80	.0198	.58	.485	.44	1.013	.62
1980/81	.0043	.16	.288	.33	.506	.38
1981/82	.0170	.38	.176	.06	.636	.85
1982/83	.0170	.77	.376	.90	1.011	.87
1983/84	.0095	.30	.265	.48	.265	.14

[1]Derived assuming 12-week hedges in each market.

The lower portion of Table 2 indicates the HR^* and E for each crop year individually. The results indicate that in each market these parameters are quite unstable, deviating from the more aggregated analysis substantially. The optimal hedge ratios for soybeans ranges from .0043 to .0227; those for soybean oil range from .176 to .607; and those for FOB Duluth range from .265 in 1983-84 to 1.01 in 1979/80 and 1982/83.

Similar variations exist in the measure of hedging effectiveness. For example, the effectiveness of the soybean oil for hedging spot sunflower at

Duluth ranges from .06 to .90, which is the proportion that risk is reduced. These results are particularly important for merchants cross-hedging of sunflower into soybeans or soybean oil. Use of an overall hedge ratio (e.g., .314) derived from aggregate data may not be very effective in reducing risk in particular years. Using the aggregate ratio for soybean oil would have resulted in being overhedged in 1981/82 and 1983/84 and underhedged in each of the other years. The likely cause of this instability in hedge ratios is the fundamentals of the oilseeds markets. Of particular importance is: 1) supply/demand conditions in sunflower; and 2) whether the oilseed market is being driven by the oil value or meal value (see Wilson, 1985 for a more thorough discussin and analysis of this problem). Consequently, merchants cannot divorce hedging decisions from fundamental market analysis, especially in the case of cross-hedging.

VI. Conclusions

Participants in the sunflower market have several alternatives for managing price risk. Two most commonly available include: 1) use of same type of cash-forward market such as the Duluth FOB sunseed market; and 2) cross-hedging in soybeans and soybean oil. Optimal hedge ratios for hedging or cross-hedging spot Duluth sunflower in soybeans and soybean oil futures and the FOB Duluth cash-forward market were derived. The results indicated that over an aggregated period that hedges in soybean oil were slightly more effective in terms of risk reduction, than hedges in the other markets. However, their relative effectiveness changed from crop year to crop year, largely in response to fundamentals of the market. The hedge ratios to cross-hedging also were quite unstable throughout the period 1977-1984. Consequently, using a hedge ratio year in and year out may not necessarily minimize risk. Further, sunflower merchants, particularly those cross-hedging must combine fundamental analyses with hedging decisions.

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