The Influence of Hedging on Futures Markets Activity: Some Further Evidence

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Introduction

In recent years, futures markets have experienced remarkable growth both in the use of well-established markets and in the creation of new markets. In 1977, average month-end positions (total open contracts) in wheat, corn, and soybeans had grown by an average of 261 percent from their 1965 levels. Volume of contracts traded grew by 422 percent. The list of futures markets created over this same period is equally impressive in its diversity and in its distinctly nonagricultural character. On the agricultural side, new contract markets include live cattle, pork bellies, frozen concentrated orange juice, and broilers. On the nonagricultural side, new contract markets include wood products (lumber and plywood), currencies (Canadian dollar, Deutsche mark, French franc, Japanese yen, Mexican peso, British pound, Swiss franc), interest rate futures (GNMA mortgages, 90-day Treasury bills, Treasury bonds), and precious metals (silver coins, gold bullion, gold coins, palladium, and platinum).

In light of this growth, it is desirable to reexamine many long-held propositions about futures markets. Perhaps the most widely held and commonly accepted is that the business levels of futures markets reflect commercial as distinct from speculative needs. In the absence of commercial use, certain futures markets have ceased to exist, and fundamental changes in a commodity's underlying production patterns have often caused fundamental changes in contract specifications. For example, Gray (1979) has argued recently that changes in the marketing of corn and wheat have caused changes in the commercial use of those futures markets.

This paper examines the characteristics of commercial use of a variety of futures markets. Historical data are employed to establish the early character of this use in the markets for wheat, corn, and soybeans. To examine Gray's hypothesis, these patterns are contrasted to those which have emerged in the more recent periods. The paper then considers commercial use in the potatoes, pork bellies, and live cattle futures markets which, while not new commodities in the 1980's sense, differ in production and marketing characteristics from the storable grains. Finally, similar analyses are made of the few data that are available for the most successful of the financial futures markets, GNMA mortgages and 90-day Treasury bills.

Background

Evidence that patterns in the statistics of futures market use reflect commercial and not speculative users began appearing in the 1980's. In the futures market statistics, commercial users are the hedgers. They comprise all those firms which trade futures contracts in conjunction with some operation—production, marketing, or processing—in the cash commodity business.

In 1932, Hoffman (1932a) presented evidence that the quarterly net positions of large hedgers in the corn futures market reflected visible supplies of corn over the period 1925-1930. Net corn hedging was predominantly short, and varied inversely with stocks of corn. That is, as corn stocks grew large, net short hedging grew large. Irwin (1935) added to the evidence, showing that total open interest in all wheat futures was a direct reflection of visible supplies of wheat over the period 1924-1933.

Though from different markets, these data formed the basis of the most commonly cited indications that futures markets are hedging markets. Total
open contracts on a futures market reflect hedging positions and these in turn reflect variations in the movement (here stocks) of the underlying cash commodity. If futures markets reflected speculative instead of hedging interests, total open interest ought to be greatest at time of greatest uncertainty, which for grain markets is prior to harvest. Instead, open interest peaked significantly after harvest, reflecting the peak in stocks which are in commercial hands. Hoffman (1941) and, much later, Schonberg (1956) put both pieces of the evidence together for wheat, corn, and soybeans. Together, these have remained the only published references to the generally accepted proposition that statistics of futures markets use reflect hedging needs.

Accepting the proposition does not mean, however, that all markets reflect the same patterns. For example, as Gray (1960) noted, the difference between seasonal patterns in the corn and wheat markets can be explained by the differences in timing of commercial movements of these two crops. Similarly, Gray’s (1961) analysis of the patterns of hedging and speculation on the three active wheat markets provides a different insight into the fundamental importance of hedging to futures markets. Kansas City and Minneapolis were much smaller futures markets in the 1950's and 1960's than Chicago, but they survived (and more recently have been thriving) by providing a specialized contract, more closely attuned to commercial needs, and patterns in the use of the individual markets reflected these hedging needs. Gray (1961, p. 24) concludes. “Open interest on futures markets depends upon hedging… This tends to be true also of the aggregate of wheat futures contracts and hedging, but when the aggregate is divided into its components, the dependence of open interest at particular markets upon hedging is seen to be somewhat more complicated, but still very close.”

Comparisons of seasonal patterns are not the only evidence which demonstrate the importance of commercial users to futures markets. Perhaps the strongest is provided by Working’s description of the near demise of the Kansas City wheat futures market in 1953. Prior to 1953, the Kansas City market had been a hard winter wheat market. The contract did not specifically call for delivery of hard winter, but normal price relationships among the three wheats (hard winter, hard spring, and soft winter) and the Kansas City market’s central importance to the hard winter producing areas had dictated delivery of only hard winter wheats. In 1953, however, hard winter wheat was in very short supply, and a significant premium developed. As a consequence, it became profitable to move soft wheats from the Chicago hinterlands to Kansas City and deliver them against expiring contracts. The Kansas City market thus became a soft wheat market, removing any incentive for hedges to use it in preference to the Chicago market. Hedging left the Kansas City market, and with it went the market. The contract was rewritten, calling for delivery of hard winter wheats only, and the hedges returned (Working, 1954).

While this is the most vivid illustration of the importance of commercial users to futures markets, other examples can be found in the more gradual process of contract development and revision. Unfortunately, much of the experience in contract development is within the research and development departments of commodity exchanges. Sandor’s (1973) description of the development of the plywood market is an exception. He provides clear indication of the importance of commercial needs in contract design. Exchanges try to develop
a contract which has as much commercial appeal as possible within the confines of contract requirements like delivery provisions. Similarly, Miracle's (1972) account of the demise of the refrigerator egg contract is an account of fundamental changes in the production and marketing of eggs. Changed industry practice led ultimately to a new contract, calling for delivery of fresh eggs. Finally, Powers (1967) discusses the series of changes in contract provisions which accompanied the introduction of futures trading in frozen pork bellies. These changes reflect the exchange's efforts to bring a contract into line with standard commercial practices.

Taken together, the evidence is clear: futures markets reflect commercial needs. However, much of the evidence is dated and comes from the corn and wheat markets. This paper updates the evidence from the agricultural markets in the light of recent major changes in commercial needs and considers similar characteristics in the futures markets for nontraditional agricultural commodities and for two of the most successful nonagricultural commodities.

The analysis of seasonal patterns in total open contracts, net hedging, and visible supplies begins with establishing the historical relationship for wheat, corn, and soybeans. Data assembled covered the period 1947 to 1978. During most of this period, crop year 1947/48 through crop year 1971/72, prices for these grains were heavily influenced by government loan programs and the accumulation of large stocks under government control. The degree of government involvement varied as between years and as among corn, wheat, and soybeans, but the entire period can nevertheless be described as one of controlled markets. The remaining six years, 1972/73 through 1977/78, were a period of relatively free markets. The large government stocks of corn and wheat were depleted in 1972/73. Export subsidies and other incentives were removed. The latter portion of this period includes the reinstatement of a grain-reserve program, but the period as a whole was one of relatively free markets.\(^1\)

Seasonal patterns were estimated for visible supplies, total open interest, and net hedging positions. Visible supply measures stocks of grain in commercial hands; it excludes farm stocks and stocks held by processors (soybean crushers, flour millers, and corn millers). Total open interest is a measure of total activity on futures markets, being the sum of all open contracts on one side of the market. Net hedging is the difference between the reported long hedging positions and the reported short hedging positions and measures the activity of the large commercials in futures markets.\(^2\) The analysis was done on a crop-year basis, and the results are plotted in terms of months after harvest. For wheat, the first month after harvest is July 30, for corn it is October 30, and for soybeans it is September 30.

The average seasonal in visible supplies of each of these commodities during the early period is in Figure 1. Wheat stocks peak earliest after harvest and begin building slightly before the following harvest, seeming to put the wheat seasonal one month out of phase. The difference is more apparent than real, however, since the wheat crop has the longest harvest period of the three crops and the designated harvest point (June 30) is thus less representative.

\(^1\) See Gray (1976) for a description of the changes in grain markets and marketing which began with the 1972/73 crop year.

\(^2\) Hedging is measured by the series "reported hedging" in the monthly position reports. Hedge positions in the grain markets were reportable if they were greater than 200,000 bushels prior to June 1977 and greater than 500,000 bushels thereafter.
The significant differences among the three seasonals are the size of the average stocks and the variability of stocks over the seasons. Both differences are due to the choice of visible supplies as a measure of stocks in commercial positions.

In terms of total production, the corn crop is by far the largest, wheat is a poor second, and soybeans are an even poorer third. However, a large percentage of the corn crop never enters the visible supply since it is fed on or near to the farm where it was grown. For example, in the last six years of the historic period, nearly 50 percent of the crop did not leave the farm. By contrast, virtually all of the wheat and soybean crops is sold into the commercial supply channels. The three commodities also differ in the portion of the commercial supply that is included in visibles. Much wheat moves from farms to merchants and thence to mills, other processors, or export channels, so that a sampling of elevator supplies captures much of the total commercial movement. A significant percentage of the soybean crop, however, moves directly from farms to processors and never appears in the "visible" supply.
Thus, soybean stocks appear to be much smaller relative to crop size and percentage changes in stocks much larger.  

These varying patterns in seasonal supplies of the three commodities are reflected directly in the statistics of market activity. Net hedging is a measure of commercial use of markets and reflects market use by both the storage sector which normally buys the cash commodity and sells futures but also by merchants and processors who may have sold the cash commodity (often forward) and have bought futures. Thus, seasonals in net hedging reflect the degree of seasonal imbalance between these two types of commercial users.

The seasonal patterns shown in Figure 2 for wheat, corn, and soybeans clearly reflect the underlying variation in stocks. Net hedging in wheat is again one month out of phase with the other two series, a direct reflection of similar differences in the stocks patterns. Net hedging in wheat was also the most unbalanced, both on average and seasonally. Wheat hedgers averaged 31.9

Figure 2. Average monthly net hedging in wheat, corn, and soybean futures markets, pre-1972

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3 Mill stocks of wheat represent a sample of millers which report positions quarterly to the Millers National Federation. Processor stocks of soybeans are available monthly from the Census Bureau and are reported in the Chicago Board of Trade Statistical Annual. In the 1971 crop year visible supplies of wheat averaged 23.1 percent of total off-farm stocks and mill stocks averaged 10.2 percent. For soybeans, visible supplies averaged 13.5 percent of off-farm stocks and processor stocks averaged 39.6 percent.
million bushels net short over this period, while corn and soybean hedgers were 31.4 and 16.2 million bushels net short, respectively. Net wheat hedging changed seasonally by 51.5 million bushels, with seasonal changes of 50.4 and 40.4 million bushels in beans and corn, respectively.

Surprising, in this comparison, is the degree of hedging balance in the corn market during this period. The portion of the corn crop which was commercially processed was trivial relative to wheat and soybeans. Domestic feed uses of corn were mostly on the farms where it was grown and not hedged. Commercial feedlots were not nearly as important as they are today. Finally, exports of corn were a small part of available supply relative to exports of soybeans and wheat. The corn market could be expected to have relatively few long hedgers to offset the short hedgers. Examining the data by subperiods within the 24-year period confirms more nearly this expectation. Over the first 16 years (1948-1963), long hedging in corn averaged 39.7 percent of short hedging, or net hedging averaged 22.5 million bushels short. Over the following eight years, long hedges averaged 62.0 percent. Exports of corn, which had averaged only 140 million bushels in the decade of the 1950's, more than trebled to 506 million bushels in the 1960's.

Figure 3. Monthly average total open interest in wheat, corn, and soybean futures markets, pre-1972.

![Graph showing monthly average total open interest in wheat, corn, and soybean futures markets](image)

Source: Appendix Table 1

Average seasonal patterns in total open interest, the second measure of futures market activity, are shown in Figure 3. Open interest for all three commodities peaks shortly after harvest, more or less in conjunction with the peaks in visible supplies and short hedging. Open interest declines steadily over the season to a minimum shortly before the subsequent year's harvest, again in consonance with the seasonal decrease in net short hedging and visible supplies. The open interest pattern in wheat is again one month out of phase with the others.

Perhaps the most interesting anomaly in the open interest series is the size of the soybean market. Hedging was most nearly balanced in this market and average stock levels did not approach those of the wheat market even when allowance was made for stocks held by processors. To the extent that markets
reflect commercial use, one would expect a larger open interest on the larger market. Two other influences, however, must be recognized. First, government loan programs were larger for both wheat and corn than for soybeans. As a consequence, there was greater uncertainty in the soybean market and a larger percentage of commercial activities were hedged. Second, the relative balance in hedging in the soybean market masks this greater reliance on hedging. Examination of long and short hedging reveals a pronounced tendency for the separate series to change in opposite directions. When short hedging increased, long hedging decreased. Larger total market participation is required to offset these different needs.

The consonance among the three indicators of market activity, visible supply, net hedging, and total open interest, is the evidence which led previous writers to assert that futures markets depend upon commercial use for their survival. Updating the evidence from their studies has uncovered interesting differences among markets but has confirmed their impression. The most interesting anomaly the comparison among the three grains has shown is the size of the soybean open interest relative to either stocks or net hedging. This anomaly will be examined again below with more direct tests of the dependence of open interest on hedging, but first the preceding analyses are updated.

Current Market-Use Patterns in the Grains

With the 1972/73 crop year, the markets for U.S. grains changed dramatically. Government-held stocks of corn and wheat were depleted and export demand exploded. Futures markets activity grew with the activity in the cash markets. In 1971, month-end open interest averaged 149.5 million bushels of wheat, 261.8 million bushels of corn, and 290.8 million bushels of soybeans. By 1977, these figures were 335.4, 590.2, and 498.3 million bushels, respectively. Commercial use of futures market grew more than proportionately. Short hedging of corn, which was averaging 46.6 percent of total open interest in the pre-1972 period, averaged 61.9 percent of the open interest from 1972-1977. Simultaneously, long hedging grew from 23.9 to 61.9 percent of the open interest. In the soybean market, long hedging grew from 20.7 to 42.2 percent of the open interest while short hedging grew from 29.9 to 42.0 percent of the open interest. Long hedging in the wheat market grew from 22.9 to 61.1 percent of the open interest and short hedging from 44.7 to 64.6 percent.

Examination of open interest, hedging, and stocks data from the most recent six-year period, 1972/73-1977/78, reveals large changes from the earlier seasonal patterns and at first glance suggest that hedging and commercial needs have become less important in explaining market behavior. Seasonal fluctuations in stocks, shown in Figure 4, are significantly larger both absolutely and relatively. With a clear increase in seasonal variability in stocks of these grains and, hence, in hedging needs, the previous arguments lead to an expectation of similar changes in the seasonal in open interest and net hedging, as well. Current seasonal behavior of net hedging is shown in Figure 5 while that for open interest is shown in Figure 6. These charts show corresponding increases in seasonality in neither hedging nor open interest. Examination of the regression results in the Appendix reveals that the "seasonals" shown in the charts are not significant. In contrast with the pre-1972 results, each regression from the 1972-1977 period has at most one or two significant seasonal coefficients.
Looking first at the open interest figure, some hint of seasonality remains. Open interest in all three markets peaks four months after harvest, with the lows appearing as early as six months and as late as ten months after harvest. Note, however, that for all three markets, the only deviations which are significant are those at the peak or the trough. In addition, even these deviations are not as significant as they were in the earlier period.

Examination of the net hedging results in Figure 5 shows more clearly the absence of any seasonal. In the recent period, hedging had become more
nearly balanced in all the markets with little significant deviation from overall balance. While the earlier figures on market growth showed that all hedging had become much greater in relation to the total market, these charts show clearly the effects of the more-than-proportionate growth in long hedging relative to short hedging. Export data from the recent period confirms the growth in the long hedger's need of futures markets. From 1966 to 1971, exports of wheat averaged 47.6 percent of total annual disposition. From 1972-1977 they averaged 59.2 percent. Corn exports grew even more dramatically averaging only 12.8 percent of disposition from 1966 to 1971 and 26.0 percent from 1972 to 1977. Soybean exports grew from 32.4 percent to 38.9 percent of disposition.

Thus, the radical changes in the distribution of open interest and net hedging coincided with significant changes in the marketing of these crops. The largest
Export growth was in the corn market and commercial users are now net long on average. The absence of regular seasonal variation in the open interests of these three commodities reflects the changes, now nonseasonal demands of hedgers. Further, speculation has become much less of an important factor in the total market.

To examine more closely the relationships between hedging use and total market activity, two measures of hedging needs are compared with total open interest for each of the three markets. First, net hedging, the unbalanced demands of the commercial users, is taken as the independent variable in accordance with the view that speculation provides the required offset to unbalanced hedging needs. Second, the sum of the reported long and short hedging is taken as the independent variable. This measure of commercial users' demands upon the market was suggested by Working (1960), on the grounds that separate speculative positions are required to offset each hedging position.

The degree of correspondence in these comparisons, the $R^2$, is presented in Table 1. The correlation between net hedging and total open interest varies inversely with the degree of hedging balance in a market. The less balanced are hedging demands, with the wheat market in the pre-1972 period being the least balanced; the more highly correlated are total open interest and net hedging, with the wheat market's 67 percent the highest observed correlation. The more balanced are the hedging demands upon the market, the less useful is net hedging in describing total market activity. The extreme here is provided by the results from the corn market in the current period with net hedging averaging 7.5 million bushels and explaining less than one percent of the
Table 1. The relationship between hedging and total open interest on wheat, corn, and soybean futures markets

| Commodity and period | Percent of the variation in total open interest explained by:  
<table>
<thead>
<tr>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net hedging positions (percentages)</td>
</tr>
<tr>
<td>All wheat</td>
<td>1947/48-1971/72 67.4</td>
</tr>
<tr>
<td></td>
<td>1972/73-1977/78 47.7</td>
</tr>
<tr>
<td>Corn</td>
<td>1948/49-1971/72 46.7</td>
</tr>
<tr>
<td></td>
<td>1972/73-1977/78 0.1</td>
</tr>
<tr>
<td>Soybeans</td>
<td>1951/52-1971/72 11.2</td>
</tr>
<tr>
<td></td>
<td>1972/73-1977/78 42.4</td>
</tr>
</tbody>
</table>

*Squared correlation coefficients.


movement in open interest. The sum of the hedging positions, on the other hand, provides a good explanation of the total open interest in virtually all situations regardless of the degree of market balance and it always provides a better explanation of the changes in open interest than net hedging does.

The evidence in Table 1 cannot be interpreted as establishing a causative relationship between hedging and open interest. Basic market identities lie behind the relationships estimated here, and an appropriately defined measure of total speculation (including reported speculation, spreading, and nonreporting speculation) would do as well in explaining open interest. However, the correlations presented in Table 1 when combined with the earlier analysis of seasonality establishes the dominant influence of hedging in determining total market activity. No reasonable explanations of speculative behavior can account for both the earlier seasonality and its more recent absence. Commercial needs do explain the seasonal behavior, the observed differences among the commodities, as well as the absence of seasonality recently. Finally, the increased market balance of the recent period reaffirms the earlier arguments of Working (1960). Net hedging is not the most useful view of the demands commercial users make on a market. Speculation is needed to offset both the long hedge position and the short hedge position. Only rarely are long and short hedgers sufficiently alike in date and amount to be offsetting, although increased balance increases the probability of such correspondence. The appropriate view of minimum required speculation is that it must approximate total hedging demand, so that total market activity does reflect the demands of commercial users.

Commercial Use in Five Other Futures Markets

Examination of the relationship between market activity and commercial use is extended to five other futures commodities: Maine potatoes, live cattle, pork bellies, 90-day Treasury bills (T-bills), and Government National Mortgage Association certificates (GNMA's). The three agricultural commodities were chosen because their production and marketing patterns provide interesting contrasts with those of the grains. T-bills and GNMA futures were selected because they are the oldest of the financial futures and most likely to reflect more settled patterns of use.
Figure 7. Seasonal patterns in net hedging and total open interest in Maine potato futures 1952/53-1974/75

<table>
<thead>
<tr>
<th>Position (thousand contracts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 30</td>
</tr>
<tr>
<td>-8</td>
</tr>
</tbody>
</table>

*Net hedging is plotted as monthly averages while total open interest is plotted as monthly deviations from annual averages with zero representing the annual average.

- net hedging, mean = -2,223 contracts
- total open interest, mean = 9,054 contracts

Source: Appendix Table 1

The Maine potato futures market is the oldest of these markets. Maine potatoes, one of the many fall potatoes, are harvested in the fall and stored. Consumption out of storage is continuous until the following spring. From late spring until the next harvest, potatoes are not stored. A seasonal in Maine potato stocks would start from zero prior to harvest, rise rapidly to its postharvest peak, steadily decline until April or May, and remain at zero until the subsequent harvest. Maine potato futures have delivery months only over
the storage season when stored potatoes are available. Trading in these futures contracts is continuous so that there is a significant period in the summer each year when trading occurs but there are no stocks of potatoes existent.\textsuperscript{4}

Seasonal patterns in net hedging and total open interest in potato futures are shown in Figure 7, with open interest plotted as deviations from its mean rather than as monthly averages and with October 30 as the first month after harvest. The period of the analysis is 1952/53-1974/75; later years were omitted due to the continuing contract difficulties late in the storage season.\textsuperscript{5}

Hedging in potatoes was net short an average of 2,223 carlots and none of the monthly averages were positive. Long hedging, an insignificant factor in the Maine potato market, averaged less than 8 percent of the total open interest over the entire period. Hedging, basically all short hedging, is at a minimum in May (Month 8), the end of the storage season. From May through December hedging grows increasingly net short and the majority of the seasonal increase in short hedging occurs over the growing season, May through October, not over the storage period. Total open interest changes similarly over the season, peaking in December and reaching its low in May.

Since stocks of potatoes are not held between May and the new-crop harvest in October, the majority of the seasonal increase in short hedging cannot reflect storage hedging as is characteristic of the grains. The sporadic surveys of ownership of positions in potato futures show most of the hedging is done by grower/dealers, the reverse of findings of similar surveys of the grain markets where grower hedges are never large participants. The seasonal increase in short hedging in the absence of stocks of potatoes reflects directly the importance of grower hedges in potato futures. Thus, though the pattern is fundamentally different than that observed in the grains, hedging use does reflect commercial needs and total market activity reflects hedging use.

Pork bellies and live cattle represent the oldest of the continuing futures markets for meat and animal products. Their marketing characteristics are representative of this group. Pork bellies are both storable and continuously produced. Live cattle, on the other hand, though continuously produced are not storable in a deliverable form. Previous work by Powers (1967) established the existence of a seasonal in total open interest in pork belly futures which clearly reflected the seasonal movements of bellies into and out of storage.

Figure 8 depicts the seasonals in both net hedging and total open interest over the period 1971-1978 for pork belly futures. The calendar is taken as the crop year and open interest is again plotted as deviations from the annual average. Over this period, reported hedging averaged 520 contracts net short and open interest averaged 11,550 contracts. The unique feature of the pork belly market is the relative insignificance of hedging in the total market. Long hedging averaged 3.4 percent of the open interest while short hedging

\textsuperscript{4}See Gray (1972) and Tomek and Gray (1970) for an analysis of the pricing role of these futures as well as a more detailed description of potato marketing patterns.

\textsuperscript{5}There were significant contract defaults in the spring of the 1975/76 crop year. In addition, deliverable supply problems and consequent exchange actions affected trading in the May contract in each of the following two years.
Figure 8. Seasonal patterns in net hedging and total open interest in the pork belly futures market, 1971-1978

*Net hedging (long minus short reported hedging) is plotted as monthly averages while total open interest is plotted as monthly deviations from its annual average with zero representing the overall average.

- net hedging, mean = -520 contracts
- total open interest, mean = -11,550 contracts

Source: Appendix Table 1

averaged 8.2 percent. Thus, the belly market is the most speculative of the markets examined so far and may be the most speculative of all the futures markets. In spite of the dominance of speculators, however, Figure 8 shows a clear seasonal in total open interest which reflects the seasonal in net hedging. Net short hedging peaks twice during the average year, in May and in the December-January period, with the May peak being the largest. The seasonal in hedging reflects inventory movement as in the grain markets. Pork bellies begin to move into storage in the fall. Stocks are gradually accumulated until the following spring (May), when the current hog slaughter can no longer satisfy consumption needs and the accumulated stocks are drawn down.
Figure 9. Seasonal patterns in net hedging and total open interest in live cattle futures, 1972-1978

Position (thousand contracts)

*Net hedging (long minus short reported hedging) is plotted as average levels while total open interest is plotted as deviations from its annual averages. One contract represents 40,000 pounds of choice steers.

- net hedging, mean = -13,500 contracts
- total open interest, mean = 9,054 contracts

Source: Appendix Table 1

Within this overall seasonal pattern, there tends to be a secondary seasonal with some relatively small decumulation of belly stocks between December and January or February. Thus, the seasonal in net hedging exactly mirrors the underlying seasonal in stocks movements. The total open interest continues to reflect hedging needs even though they form such a small component of the total market.

Live cattle is another continuously produced commodity, differing from pork bellies in that there are no stocks. The commercial users of the cattle futures market are primarily producers (livestock farmers, beef producers, and
ranchers) and the first processors (livestock slaughterhouse operators and meat packers) according to the data from the May 1969 survey of the market. Interestingly, the survey results suggest that reported hedging is predominantly that of the first processors, not the producers. Producers held the largest aggregate market positions and these were nearly balanced with 6,006 contracts on the long side and 7,669 contracts on the short side. However, there were 1,160 traders holding these positions. With reporting requirements set at 25 contracts, a large number of these positions would not have been reportable and not included in the data analyzed here. For the first processors on the other hand, 38 traders held 1,448 contracts on the long side and 4,036 contracts on the short side. Most of these positions would have been reportable. Thus, while producers are an important consideration in the overall composition of the trade, they are likely to be relatively unimportant when examining the behavior of reported hedging.

The plots in Figure 9 show there to be little seasonality in either net hedging or total open interest. Reported hedging in the cattle market is predominantly short hedging. Long hedging comprises only 8.0 percent of open interest on average while short hedging accounts for some 40.2 percent of open interest. The most interesting result here is the clear correspondence between changes in net hedging, which is always short, and changes in open interest, even though these month-to-month differences are not, in general, large.

Two nonagricultural futures markets, 90-day T-bills and GNMA’s, have been included as well. The available data from these markets is not extensive since publication of reportable positions in these markets began only in July 1978. In addition, there has been one complete survey of market participants, on November 30, 1977, which predates the publication of reportable positions. The data in Table 2 report the occupational distribution of commercial users of these markets. The principal users of both markets are securities dealers. Mortgage bankers, investment companies, and savings and loan associations are also important users of the GNMA market while commercial banks, real estate developers, and builders are additional important users of the T-bill market. With reporting requirements established at 25 contracts, these are also the users likely to be represented by the reported hedging data.

For the 12-month period July 1978 through June 1979 reported long hedging in T-bills averaged 6,152 contracts, an average of 12.2 percent of open interest. Short hedging was nearly balancing, averaging 7,041 contracts or 13.1 percent of the open interest. In the GNMA market, reported hedging was also nearly balanced, averaging 18,084 contracts on the long side and 19,637 contracts on the short side or 30.9 and 33.4 percent of open interest, respectively. The 1977 survey data confirm the impression that hedging tends to be balanced in these two markets. Including all hedgers, long hedging accounted for 41.0 percent and short hedging accounted for 34.1 percent of the open interest in T-bills on November 30, 1977. In the GNMA market, the comparable percentages were 42.9 and 41.3. The most striking difference between reportable hedging positions and all hedging is in the T-bill market where less than one third of all hedging appears to be reportable. This difference is due primarily to the difference between markets in the dollar-equivalent of reportable positions. In the GNMA market, a reportable position represents $2.5 million while in the T-bill market a reportable position represents $25 million. Thus, reported
Table 2. Composition of hedging in GNMA and 90-day T-bill futures markets on November 30, 1977

<table>
<thead>
<tr>
<th>Occupation</th>
<th>GNMA hedgers&lt;sup&gt;a&lt;/sup&gt;</th>
<th>T-bill hedgers&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of traders</td>
<td>Long (contracts)</td>
</tr>
<tr>
<td>Mortgage banks</td>
<td>34</td>
<td>894</td>
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<tr>
<td>Commercial banks</td>
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<tr>
<td>Securities dealers—FCM&lt;sup&gt;1&lt;/sup&gt;</td>
<td>4</td>
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<tr>
<td>Securities dealers—non-FCM&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>Savings and loan associations</td>
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<td>Investment companies</td>
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<td>Institutional investors</td>
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<td>Other financial institutions</td>
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</tr>
<tr>
<td>Real estate developers and builders</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Other commercial interests</td>
<td>7</td>
<td>1,362</td>
</tr>
<tr>
<td>Commercial use total</td>
<td>121</td>
<td>8,500</td>
</tr>
<tr>
<td>Total market</td>
<td>998</td>
<td>19,811</td>
</tr>
</tbody>
</table>

<sup>a</sup> One GNMA contract represents $100,000 principal balance of 8 percent GNMA certificates and one T-bill contract represents $1 million of 90-day Treasury bills.

<sup>b</sup> Distinguishes securities dealers who were also commodity brokers (futures commission merchants) from those that were not. In the former case, it was “impossible to determine whether such a position was held by the firm in its sale as a securities dealer or in its role as a futures commission merchant” (Hobson, op. cit., p. 24).


hedging in the GNMA market is likely to be more broadly representative than that in the T-bill market. Both, however, seem to represent well the essentially balanced nature of hedging in these markets.

With only 12 observations on hedging in these markets, a seasonal analysis is not possible. However, with the available data, one can examine the relationship between open interest and hedging, albeit with due caution accorded to the sample size. The results of this analysis for the grains appeared in Table 1. For comparative purposes, similar analyses were performed for all five of the markets examined here and the results are reported in Table 3. All the correlation coefficients compare favorably with those from the grain market. The results in Table 3 again emphasize the Working concept of total hedging needs, the sum of the hedging positions. The more nearly balanced a market, the more necessary it is to permit both the long and the short hedging to have an explanatory effect. The live cattle and Maine potato markets were the most unbalanced of the markets examined, both dominated by short hedging. In both, net hedging explains a significant portion of the variability in open interest and is nearly as good an explanatory variable as the sum of the
Table 3. Relationships between hedging and total open interest for some nontraditional futures markets

<table>
<thead>
<tr>
<th>Commodity and years</th>
<th>Percent of the variation in total open interest explained by: $^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Net hedging positions (percentages)</td>
</tr>
<tr>
<td>Maine potatoes</td>
<td>1952/53-1974/75</td>
</tr>
<tr>
<td>Live cattle</td>
<td>1972-1977</td>
</tr>
<tr>
<td>Pork bellies</td>
<td>1971-1977</td>
</tr>
<tr>
<td>GNMA certificates</td>
<td>July 1978-June 1979</td>
</tr>
<tr>
<td>90-day Treasury bills</td>
<td>July 1978-June 1979</td>
</tr>
</tbody>
</table>

$^a$ Squared correlation coefficients.


hedging positions. Pork bellies, GNMA's, and T-bills are nearly balanced markets and net hedging is a poor explanatory variable. However, the sum of the commercial positions does explain significant percentages of the variability in open interest.

The other striking aspect of this analysis is how well the results from the financial markets compare to the agricultural markets and, especially, to the grain markets. The sum of the reported hedging positions in the GNMA market explained 93.8 percent of the variation in open interest, the highest percentage observed in all the results. T-bill hedging performed less well, but reported hedging was much less representative in this market. The poorest performer is the pork belly market where hedging was the smallest percentage of the open interest. Perhaps the most curious result about the belly market is the continued, significant reflection of seasonal stocks variations in the open interest patterns in spite of the overwhelming dominance of speculators.

Summary and Conclusions

The analyses here have explored the relationships between commercial use and total market participation in futures markets for both agricultural and nonagricultural products. Seasonality of commercial use of the grain markets, the predominant characteristic of historic patterns, was dictated by seasonality in stocks of annually produced, continuously consumed commodities. Total market use was shown to reflect this seasonality, as well. In the current period, seasonality in commercial needs had virtually disappeared. While stocks remained seasonal, the tremendous growth in exports and, hence, in commercial long hedging completely offset the storage, short hedging needs. Hedging was evenly balanced with few significant seasonal deviations. Further analysis showed, however, that total market use was still dependent upon hedging needs, with hedging explaining an average of 80 percent of the variation in total open interest.

Analyses of five other futures markets reaffirmed the fundamental dependence of market use on commercial needs. The Maine potato market, dominated by grower/dealer hedging, reflected these needs in a significant, nonstorage seasonal increase in net short hedging and, consequently, in total
market use. The pork belly market was the most highly speculative of the markets examined here and it revealed clear indication of the importance of underlying commercial uses. No significant seasonal variations were found in the live cattle market, but, again, what variations were observed were also observed in total market use. In addition, hedging on these markets was seen to explain percentages of open interest comparable to the results from the grain markets with the exception of the pork belly market. Commercial users of GNMA and 90-day T-bills futures markets were seen to be primarily securities dealers and bankers (either mortgage or commercial) and reported hedging by these firms explained some 70 to 94 percent of total market participation.

Futures markets are hedging markets. Their use reflects the commercial needs of firms simultaneously operating in the cash markets. Speculation is required on futures markets as a response to commercial needs and can be best understood as offsetting both the long and the short hedging positions of commercials, not their net position. Measures of minimum speculative needs on a market ought to reflect total hedging requirements of the commercial users of that market.
Citations


Millers National Federation, "Quarterly Comparison of Wheat Stocks, Mill Operations, Etc.," quarterly.


### All Wheat (million bushels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Hedging</th>
<th>Open Interest</th>
<th>Visible Supplies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967/68 to 1971/72</td>
<td>-31.9</td>
<td>116.5</td>
<td>268.5</td>
</tr>
<tr>
<td>1972/73 to 1977/78</td>
<td>-15.1</td>
<td>273.7</td>
<td>275.7</td>
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</table>

#### Soybeans (million bushels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Net Hedging</th>
<th>Open Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967/68 to 1971/72</td>
<td>-16.2</td>
<td>117.2</td>
</tr>
<tr>
<td>1972/73 to 1977/78</td>
<td>-0.3</td>
<td>9.3</td>
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(continued on following page)
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<td>Net hedging</td>
<td>1951/52-1971/72</td>
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<td>22.9</td>
<td>-13.1</td>
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<td>(5.3)</td>
<td>-3.5</td>
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<td>1972/73-1977/78</td>
<td>-3.3</td>
<td>25.6</td>
<td>6.6</td>
<td>-1.0</td>
<td>4.3</td>
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<td>3.8</td>
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<td>(0.5)</td>
<td>(6.5)</td>
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<tr>
<td>Open interest</td>
<td>1951/52-1971/72</td>
<td>164.4</td>
<td>-9.5</td>
<td>22.6</td>
<td>29.3</td>
<td>35.5</td>
<td>7.4</td>
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<td>-13.0</td>
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<td>(2.5)</td>
<td>(4.5)</td>
<td>(15.0)</td>
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<td></td>
<td>1972/73-1977/78</td>
<td>369.1</td>
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<td>6.5</td>
<td>28.6</td>
<td>73.3</td>
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<td>8.1</td>
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<td></td>
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<td></td>
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<tr>
<td></td>
<td>1972/73-1977/78</td>
<td>34.6</td>
<td>-20.7</td>
<td>8.6</td>
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<td>9.5</td>
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<td>(2.9)</td>
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<td>(0.7)</td>
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<td>(4.7)</td>
<td>(6.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Live cattle (1,000 contracts of 40,000 pounds)</td>
<td>1972-1978</td>
<td>-13.5</td>
<td>2.6</td>
<td>2.2</td>
<td>0.2</td>
<td>2.3</td>
<td>2.8</td>
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<td>(1.6)</td>
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<td>(1.7)</td>
<td>(2.0)</td>
<td>(0.4)</td>
<td>(1.3)</td>
<td>(0.8)</td>
<td>(0.1)</td>
<td>(1.2)</td>
<td>(0.2)</td>
<td>(20.8)</td>
<td></td>
<td></td>
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<tr>
<td>Open Interest</td>
<td>1972-1978</td>
<td>38.9</td>
<td>5.9</td>
<td>2.9</td>
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<td>2.8</td>
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<td>(1.3)</td>
<td>(0.3)</td>
<td>(0.1)</td>
<td>(0.6)</td>
<td>(0.6)</td>
<td>(2.0)</td>
<td>(30.3)</td>
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<td></td>
</tr>
<tr>
<td>Pork bellies (100 contracts of 25,000 pounds)</td>
<td>1971-1978</td>
<td>-5.2</td>
<td>0.7</td>
<td>0.6</td>
<td>2.6</td>
<td>5.2</td>
<td>6.5</td>
<td>2.9</td>
<td>1.8</td>
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<td>.6468</td>
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<tr>
<td>Net hedging</td>
<td></td>
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<td>(0.5)</td>
<td>(-1.9)</td>
<td>(-3.6)</td>
<td>(-4.8)</td>
<td>(2.2)</td>
<td>(1.3)</td>
<td>(3.3)</td>
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<td>(3.5)</td>
<td>(11.2)</td>
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<td>Open Interest</td>
<td>1971-1978</td>
<td>115.5</td>
<td>10.1</td>
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<td>16.0</td>
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<td>(3.3)</td>
<td>(4.0)</td>
<td>(2.1)</td>
<td>(0.3)</td>
<td>(1.6)</td>
<td>(19.2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


b Years are crop years for all commodities except cattle and pork bellies which are calendar years. S1 through S11 are dummy variables whose numbers indicate months after harvest. They take on values of 1 in the specified month, -1 in the omitted (twelfth) month, and zero elsewhere. Thus, the shift for the omitted month is simply the negative of the sum of all the included variables (given that the constant is zero).

c Crop year average of the dependent variable. It adjusts the regression for changes in the annual average of the dependent variable and thus permits the seasonal variables to isolate only seasonal changes.

d Positions are the totals over the three active wheat futures markets, Chicago, Kansas City, and Minneapolis.
Anne Peck has done a good, workmanlike job of restating, updating, and extending to new commodities the standard doctrine. I commend her work. The extension of the review of the structure of the open interest for corn, wheat, and soybeans into more recent time periods not only reestablishes the doctrine, but makes the additional point that the structure of the open interests changes over time as the commerce in commodities and hedging needs of market participants change.

Analysis of five additional commodities extends the doctrine to other markets. The commercial part of the open interest in pork bellies behaves as it is supposed to in a seasonal storage market and is reflected in the total open interest. Maine potato futures reflect the changing ownership of potatoes as the growing season proceeds and makes the point that it is ownership inventories rather than physical inventories that are hedged. The examination of two financial futures clearly shows the commercial base on which these two successful markets have been built.

The data examined show a movement of commercial positions toward balance over time. This is particularly true in the case of corn and the financial futures. As commercial needs change, the balance between long and short hedges changes. In the case of corn in particular, Peck found no relationship between net hedges and open interest, but found a close relationship between the total of hedges and the total of open interest. From this she concluded:

Finally, the increased market balance of the recent period reaffirms the earlier arguments of Working (1960). Net hedging is not the most useful view of the demands commercial

users make on a market. Speculation is needed to offset both the long hedge position and the short hedge position. Only rarely are long and short hedges sufficiently alike in data and amount to be offsetting, although increased balance increases the probability of such correspondence. The appropriate view of minimum required speculation is that it must approximate total hedging demand, so that total market activity does reflect the demand of commercial users.

If I were a discussant with a strong antiscipulator bias, I would probably say, “Come now, that is a bald assertion without foundation. If there is a hedger on one side and a hedger on the other side, there is only a small time-bridging function to be served by speculators. Such speculators can be locals and need not carry price-influencing positions for protracted periods. Thus the speculating public with its erratic and unknowlegeable price-distorting influence can be eliminated.” The area needs more work. I think that there are two directions: one toward a detailed analysis of the cash positions underlying the hedges (they have major elements of speculative judgments in them) and the second toward a better understanding of the role of speculation in futures markets.

The Bias of the Study

It appears to me that the nature of the study and the conclusions reached grew out of a defensive posture. Such posture is reflected by excerpts from conclusions:

Further analysis showed, however, that total market use was still dependent upon hedging needs, with hedging explaining an average of 80 percent of the variation in open interest. Analyses of five other future markets
reaffirmed the fundamental dependence of market use on commercial needs. Futures markets are hedging markets. Their use reflects the commercial needs of firms simultaneously operating in cash markets. Speculation is required on futures markets as a response to commercial needs and can be best understood as offsetting both the long and the short hedging positions of commercials, not their net position. Measures of minimum speculative needs on a market ought to reflect total hedging requirements of the commercial users of the market (emphasis added).

This reflects a long succession of literature about futures trading that has been aimed at staving off legislative and regulatory assault on markets. The historical posture of politicians and regulators has been that the hedgers are the good guys and the speculators are the bad guys. The academic and trade response has been that speculators, however evil, are necessary. Without them, the noble purposes of prudent hedgers could not be served and the efficiencies generated by futures markets would go out of existence. I quite agree that all of this has been necessary and pretty much successful. Anne Peck has made a further contribution and I reiterate my commendation. However, I would like to raise some questions about the standard doctrine, pose a hypothesis, and suggest some directions for further study. We need to look at

Some Observations from Here and There

One of the commodities that Peck focused on is pork bellies. It is a unique and particularly interesting market. It is simultaneously both the most highly speculated and highly hedged of all futures markets. Short hedges increase and decrease with stocks in both an intra- and intercrop-year basis. Further, short hedges closely approximate total stocks of bellies. For no other commodity are short hedges a large proportion of the commercial risks associated with the commodity. No other group of commercials makes so much use of the hedging medium available. At the same time, there is a superstructure of speculation, both long and short, that so dwarfs the hedging that it is nearly balanced long and short. There may be cause and effect. It may be that commercials are attracted to the market because there is a large amount of speculation. Such a hypothesis becomes more tenable when we consider the skinned ham futures market. Valiant efforts were made to make a ham futures market work, but it never got off the ground. There is as much commercial need for a ham as for a belly market. There is variable inventory and volatile price.

Cattle

Since trading started in 1964, the cattle futures market has been a success story. Growth in recent years has been rapid. Table 1 shows

<table>
<thead>
<tr>
<th>Year Begin June 30</th>
<th>Net Open</th>
<th>Long Hedges</th>
<th>Short Hedges</th>
<th>Percent</th>
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<tr>
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<td>16.4</td>
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<td>3.9</td>
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<td>1972-73</td>
<td>25.9</td>
<td>2.7</td>
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<td>31.7</td>
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<td>1973-74</td>
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<td>1976-77</td>
<td>39.4</td>
<td>2.6</td>
<td>22.4</td>
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<td>1977-78</td>
<td>55.3</td>
<td>4.4</td>
<td>29.6</td>
<td>53.3</td>
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<tr>
<td>1978-79</td>
<td>73.5</td>
<td>5.9</td>
<td>30.1</td>
<td>46.6</td>
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</table>

questions of commercial and speculator participation in markets from a point of view of growth and development of markets. For the most part, futures markets, as measured by open interest, are quite small in relation to the commerce in the commodities traded. Further major growth is desirable.

something of the development of open interest in cattle futures. Note the rapid growth in open interest. Note that short hedges were very much larger than long hedges, but that long hedges increased over time. The imbalance of short and long hedges was necessarily associated with an offsetting speculative imbalance. The speculative
imbalance was probably much greater than the calculation would show because of the size of reporting levels. Prior to June 1, 1977, the reporting level was 15 contracts and has been 50 contracts since that time; 25 contracts is approximately 930 head and 50 is 1,860 head. It is reasonable to conjecture that a lot of the short positions of nonreporting traders were actually hedges. Finally, we should note that short hedges were an increasing proportion of the net open interest over time.

Both short hedges and net open interest were small in relation to the commercial risks outstanding. In 1978-1979, the average of the quarterly cattle on feed inventories for the 23 principal cattle feeding states was 11.5 million head. The average new open interest was 2.7 million head and the average of the short hedges was 1.1 million head.

The cattle feeding business was pretty good and cattle feeders were in a strong financial position through 1973-1974. There then followed liquidation of cattle and declining prices with massive losses in cattle feeding. The growth in short hedges doubtless reflected the losses and pressure from banks to hedge. This growth was faster than speculative growth, hence, the increasing share of the short hedges in the open interest.

This raises some interesting questions. Did the level of speculation increase in response to the commercial need to hedge, or was the amount of hedging limited by the capacity of the speculative interest to absorb hedges? The increase in the number of long hedges was large. Why? It may have been that long hedges increased because of the presence of the speculative capacity to absorb them.

Corn

Peck noted the shift in balance between short and large hedges in corn, which was associated with an increase in exports. As an aside, I would comment that we have found the size of positions held by long hedges during the harvest period to be a good indicator of subsequent exports. Long hedges reached a record level last October 31 and we are experiencing a record export year, in spite of the embargo of certain sales to Russia.

The 1975 crop year was interesting in terms of speculator behavior. It was a year of a large crop in the United States, following a near disaster in 1974. It was a year of a disastrously small grain crop in the USSR and the Russians bought large amounts of corn from the U.S. Long hedges in corn rose from 226 million bushels at the end of April 1975 to 405 million at the end of October. During the same period, short hedges increased from 215 million to 284 million. Thus, reporting hedges went from net long 11 million to net long 121 million. During the same period, reporting speculators went from net long 16 million to net short 17 million and nonreporting traders went from net short 27 million to net short 101 million. The increase in short hedges was probably the result of forward pricing by corn producers as they saw the crop developing satisfactorily and were offered acceptable prices. The long hedges were doubtless placed to offset cash forward sales to Russia. In effect, the Russians were long futures and producers and speculators were short futures. One of the things that makes this intriguing is the pattern of corn prices. December 1975 futures decreased from $3.50 per bushel in October 1974 to $2.35 in early July 1975 as the shortage from 1974 proved to be less onerous than expected and the 1975 crop developed well. The July 1976 futures rose from $2.50 in early July 1975 to $3.40 in mid-August, and were $3.15 at the end of September. The high-priced period was the one in which producers and speculators sold to the Russians. From a price of $3.15 at the end of September, the July futures price decreased to $2.70 at the end of March 1976. During that time period reporting speculators went from net short 17 million to net short 5 million and nonreporting traders went from 101 million net short to 21 million net short. The speculators accommodated the Russian purchases and made money in the process. This again illustrates the flexibility of speculators and describes the offsetting role that they play in markets. It adds a dimension: they move when the price is right.

The corn futures market is the oldest, most stable, and advanced of all markets. But it is small. During the past year, the open interest has been at record levels. Total open interest at the end of March 1980 was 790 million bushels. The net open interest was 737 million. Long hedges were 518 million and short hedges were 396 million. On the other hand, 1,000 million contracts were in 1,000 mil programs about crop of the future market so demands not have the commercial stage of life.

Wheat

The Chicago wheat futures market is the largest in the world. The Chicago Board of Trade has just over 100,000 members. The wheat futures market trades in both hard red winter and hard red spring wheat. The wheat futures contract is for 50,000 bushels.

Corn

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million. The commercial base of the market was on the order of 500 million. Total stocks of corn on April 1 were 4,780 million. Of these, about 1,000 million were isolated by government programs. The nongovernment cash base was about eight times as big as the commercial base of the futures market. Why is the corn futures market so small? Is it because the commercial demands put on it are limited or because it does not have the speculative capacity to absorb more commercial transactions? I think that at this stage of knowledge about futures trading the question is moot.

Wheat

The Chicago wheat futures market has been criticized from time to time for not keeping contract terms current with the changing commerce in wheat. There have been major changes during the past 20 years. Formerly, the predominant movement of wheat was from west to east for flour milling and eastern states were more important than they now are in wheat production. At this time, a higher proportion of U.S. wheat is produced west of the Mississippi River and exports are now about two-thirds of total use. The bulk of exports move through Texas Gulf ports and New Orleans. These changes have reduced the representativeness of Chicago as a pricing and delivery point. In response to the changing commerce, the Chicago Board of Trade developed a new contract that was Gulf-export oriented. Trading in the new contract started in 1974 and promptly failed for lack of participation. Why? It was a commercially sound contract, carefully researched, developed, and promoted. That a lack of commercial interest caused the failure is not plausible. The simple fact seems to be that the speculators elected to stay with the familiar and liquid old contract. The experience in wheat seems to suggest that speculators are more independent people in their own right than they are often given credit for.

Concluding Comment

Standard doctrine as extended and modernized by Peck says that the size of markets depends upon commercial needs and commercial uses and that speculation tends to be limited to the amount necessary to support commercial use. This describes a passive, accommodating role to
I think that the work you did was necessary, and I'm glad you did it. I really can't find any serious fault with it at all.

I thought it was very interesting—and I wished that I had had your arguments some time ago—when you pointed out that the Kansas City wheat market almost failed because the commercials didn't use it since it did not fit their purposes. You were speaking of the long hedgers. The long hedgers couldn't use that market because it would have delivered something to them they couldn't use. Since they couldn't use the market, the market failed.

As you know, the CFTC has, for some time, been calling for more and more delivery points. This was certainly an argument I could have used while testifying before them, but I hadn't thought of it. My argument was that if you put delivery points all over the world, the speculator will not want them. So it's the same thing, but it's on the other side. You made a very good argument for having very solid contracts for both sides.

Most of us who trade depend on a “feel” for the markets, and we don't have to pay too much attention to the figures. So, in addition to the figures that are certainly involved, I think it should be pointed out that the growth of volume, open interest, and new futures markets has really been a result of two factors.

First, inflation. People want to get into something that is real, and commodity futures markets are probably the easiest place they can do that. It is one of the reasons that the public flocked to the futures market. Secondly, the stories of large price movements. While large downward price movements do not really bring free participation in the futures markets, large upward movements do. The possibility of participants becoming successful attracts people to the markets. It creates a larger interest in futures. The two factors work together. You have to have a market which a commercial can use, but you also have to have a market which a speculator can use.

I want to point out one other thing while we're talking about Kansas City. This came from an industry person and you'll never find it in the classroom. You can hear some cursing around my telephone once in a while when we put orders into Kansas City wheat. For example, when you try to trade the far-off months of Kansas City wheat, you call and ask what's the December bid, and they say, "$4.63½." You say, "Sell a hundred," and then part of it comes back at $4.58! This is where I differ from all the other people in the room.

I differ from Mr. Stone of the CFTC who says the Kansas City market is almost the perfect market because the commercials do most of the trading. That's fine until you want to get in or out, whether you're a commercial or a speculative account, I'm talking to you from the real things. I'm not talking to you from any hypothesis or any chart or anything like that. I'm talking to you from the fill that gets made in the pit. You must have the speculator in these markets. There isn't any way that markets will really be successful if you're just trading one commercial off to the other, because, as Anne Peck says in her paper, one commercial doesn't always want to trade at the same time the other commercial wants to trade. You must have the speculator in the market. Perhaps it would be better for me if there weren't any speculators in the market. But you have to have them and that comes from the industry.

Now I want to talk about the many variables that don't show up in the study. I don't know if they can ever be identified, but Anne makes reference to them. I don't know how you could do it month by month, but it is extremely important, as you point out, to know what is the government control of the stocks. If the government has the control, it's just as if the grain were not there. The grain is not going to be in that market. It will hang over the market. If the government has a lot of it, everybody looks to see at what prices the government is going to release it. This is true. But it does not have the effect of grain out there which would be hedged. As Dr. Tom
Hieronymus pointed out, only a small proportion of the corn actually in the country is really in the market.

Another very important point when we’re studying this situation is who has the export contracts. For example, in Russian sales that were mentioned by Dr. Hieronymus, in some cases those sales were made by large elevator operators. What they were really doing was selling their own inventory. They had big sales to Russia, but they had big stocks. As a result there was hedging, and nothing had to show up in the futures.

However, there are very large exporters (and there is one which is getting larger by the day) that have no facilities whatever. If such an exporter makes a sale, he must immediately go into the market to buy futures. He has nothing else to do. If you have an exporter, however, who has very large originating capacity, he may make a big sale, cover the cash in that day, and you may never see it in the futures market. This is something for which, I’m sure, we do not have available figures. Therefore, this will give us a little distortion of what is really going on.

Also there is something new coming into the markets, which will make it much more difficult for all of you to study. It is the growing amount of foreign involvement. I’m not talking about some deep, dark, sinister foreign involvement. This is good, honest foreign hedging involvement. It is coming from Australia and, from Brazil. They are going back long and short. So, as you make your studies in the future, this foreign involvement will probably be bigger and bigger, and you’re going to have to take it into consideration in your figures.

Another point I want to mention. When I was rather young in the business, I learned never to go long Chicago wheat within two months of the beginning of the harvest. I think if you really study Anne’s figures, the truth of that lesson will emerge.

Perhaps I can explain another thing that shows up on the charts without an explanation. That is, commercial interests basically don’t want any ownership of any grain before a harvest. They live in the hope that the basis will be 90 under, that they can fill the elevator with it, stick the hedge on, and get very rich. I think that if, as you read Anne’s paper, you keep that in the back of your mind, it will be of some help.

Another point I’d like to make is that speculators do often lead the market. They make the point at which the commercials come in. Now what do I mean by that? This has shown up in the soybean market and it’s probably showing up in the wheat market right now. The speculators, for example, learned yesterday that because of the Mt. St. Helens explosion the entire wheat crop in the U.S. was going to get buried. They ran in to buy wheat. Well, what did that mean? It meant that these people down in the delta, looking at that most beautiful and largest wheat crop they had ever seen, enabled the commercials to buy some of this wheat from the producers down there and sell it into the market. The speculators led the action in this case, not the commercials. This has happened in the beans for the last couple of years. Last June when the soybean market came way up, producers did sell to commercials who then hedged beans way up. There are farmers who have beans sold that far ahead. Speculators, therefore, often make it possible for commercials to buy from the producers. The commercials then put the hedges into the market.

As a final, personal note. A little bit of nostalgia hit me when I was reading Anne’s paper because she mentioned Dr. G. Wright Hoffman’s study made in 1932. He was, in a sense, the father of all this. When I was a young boy, G. Wright Hoffman sat around our dinner table with my father and discussed all these things. Later, I studied under him at The Wharton School. Dr. Hoffman and my father set up the commercial exchange of Philadelphia back during the Depression, a canned goods futures market. The entire job was done by the two of them, and you can see what has happened since then. The canned goods futures market failed because a proper balance between speculators and commercials was never possible to put together. It lasted a few years and then went down the drain. I really enjoyed reading Anne’s reference to Dr. Hoffman. He was a great person. I should add just one other thing. In The Wharton School, hedging was taught in the insurance department, and that’s really what it is.
Discussion

Anne Peck: Before we open the discussion to general questions, I want to plead both innocent and guilty. I want to plead innocent on live cattle. To the extent that my memory serves me, it is indeed the case that hedging in live cattle is net short most of the time. I'm not sure I followed the arguments Tom Hieronymus was making that if you took into account all hedging, it would still be completely net short or grossly net short. From the only data I knew about in that area, the 1969 survey, the open interest suggested that if you took all hedging in that market, it was roughly balanced. The problem was that the long hedging in the market was typically smaller contracts, and, therefore, doesn't show up in the reporting numbers. In pleading part innocent, I would plead that we get some more data. Indeed, many of the market surveys we have are so out of date as to be completely meaningless for figuring out what anybody's doing. I think the appropriate regulatory group should begin looking into the possibility of surveying some of these markets to give us better information on their real composition.

At the same time, I would like to agree with Bud Frazier that it's absolutely necessary to take into account the position of the government in the stocks figures. At the moment, it's virtually impossible to figure out on any kind of regular monthly basis what the real situation is. It's not an easy task to sort out from the visible supplies what the private stocks might have been. It's even more difficult now in the farmer-held reserve. The numbers are not very frequently available.

On the guilty side, I simply agree with Tom that it's probably true that the argument was overstated. I did not really mean to overstate to the extent of suggesting that speculation is not important in these markets, or, indeed, that what speculators do is unimportant. In particular, I've also been using this data to take Working's argument a step further and look at the speculative index which he postulated as important in looking at minimum required speculation.

I will put the equation on the blackboard.

\[ T = \frac{\text{tall and short speculation}}{\text{short hedging + long hedging}} \]

Speculative index \( T \) is defined as \( 1 + \frac{\text{tall and short speculation}}{\text{short hedging + long hedging}} \). If long hedging is zero, it turns out that \( T \) equals something like total long speculation divided by total short hedging. This basically says that if there's no long hedging, there's no balancing. As a result, the measure of speculation is reflecting the average on the long side vis-à-vis what is required on the short side.

Now we don't really want to talk about whether that is the "right" measure of speculation, although I think there are some arguments in favor of it. In any event, \( T \) can never get less than one, and can go much greater than one. Minimum required speculation is \( T - 1 \). It happens that if you run this calculation through the data that I had for the three markets, you would find the following orders of magnitude. For the period before 1972, in corn, \( T \) was running on average 1.4 or 40 percent more speculation than minimally required. Post 1972, this index in corn was averaging something on the order of 1.04. This indicates that we are down to rock-bottom minimum speculation. Indeed, I would agree with Tom that it may well, at this point, be speculation—that is, the absence of enough speculation—which is keeping the open interest and hedging use at levels grossly below total commercial need, if you looked at it in terms of exports and/or stocks of the grains that are sitting around. So, to repeat, I did not mean to suggest that speculation was unimportant nor that somehow it was just following along with the hedging.

Walter Labys: I have two questions. One is whether or not you tried to look at the net speculative position or the total speculative position in relation to open interest, and whether or not you calculated some correlation.
coefficients. It seems to me that might provide some insights into the kind of questions that were raised. The second question I have is in relation to the commercial use of markets. Do you have any suggestions or have you thought of ways in which you might look at the commercial use of markets, such as the metal exchange? I've often wondered exactly how one tells how much hedging and speculating goes on at the London Metals Exchange or the Comex when we don't really have access to that kind of data.

Anne Peck: I haven't really looked at speculation in the same way that I looked at the net and sum of total hedging. However, if you had an appropriately defined measure of speculation, the fundamental market identities between total open interest and the sum of positions would show roughly the same correlations on the speculative side. The question remains: Is speculation or hedging causing this? And you're stuck with that, given that the sum of all the longs is the total open interest and the sum of all the shorts is the total open interest. A difficulty in that occurs because you have to say something about the nonreporting trade which in most academic kinds of studies is considered as only small speculation. The market surveys which we have, outdated as they are, suggest that's not the case. To answer that question, I think you would need to apportion that nonreporting trade somehow among hedgers and speculators. Then you might look at what's going on in those relationships. Even if you did that, I think you are still stuck with this fundamental identity among positions. I looked briefly at the sum side of that and found that net speculation, according to just reporting numbers, was not doing nearly as well as net hedging. I didn't try to make a complete study of the sum side because of the problem with the nonreporting trade.

As for the metals, all I can say is that I wish we could begin to get some data. If somebody could size those commercial and noncommercial users, we could begin to get some data to look at patterns in those markets. I really haven't thought about what an appropriate definition might be in those markets. Maybe others here have. We can encourage the process.

Reynold Dahl: My comment is not really a criticism, but something I think may help your paper by way of an addition. You referred on several occasions in your comments of the percentage distribution of the open interest. I think it would be helpful if you have a little figure in there showing how the percentage distribution of the open interest as held by large hedgers, the nonreporting traders, and the reporting speculators has changed over the years on both the long and the short side of the market. If you look at corn, for example, you find that it has gone on the long side from less than 20 percent of the large hedgers up to over 80 percent. Over a period of time on both the long and the short side of the market, large hedgers, as you know, have been up about 60 percent to almost two thirds. It necessarily would follow since the hedgers account for such a large percentage of the open interest on the long and short side, that one would find a strong relationship between changes in the open interest and hedgers' positions.

Anne Peck: True, except it doesn't show up on net hedging. Granted, since there is upwards of 60 and 70 percent of the total open interest on both sides, one would suspect there is a relationship there. The interesting thing is that because they are balanced in general—balance being the concept most people have used to talk about the hedging demand on the market—it turns out that it simply doesn't explain any of the change in the open interest.

William P. Culbertson: I noticed that Tom Hieronymus, in his comments and in his table, made use of the notion of net open interest, the total open interest minus spreads. I was wondering if that is that quantitatively significant to your work. Also, a question for Tom—why would that be somehow more appropriate here? My first reaction is that this seems like the thing to do here. But, on the other hand, even a spread position is speculative to a degree.

Thomas Hieronymus: The amount of spreading is a neutral sort of thing in the context of risk-shifting, and it's a neutral sort of thing in the context of price level impact. Of course, it wouldn't exist if it weren't a speculative position. The percentage of the open interest represented by reported spreads varies substantially from time to time, and substantially from market to market. On the face of it, it seems to me that it is a little bit cleaner measure of the total behavior in
the market. I don’t think that it would make any difference in the results at all. Anne has mentioned we need more cross-sections, and I’ve always wanted to look at the open interest in the silver at the Chicago Board of Trade. I will flat wager it is in excess of 90 percent spreads for purposes of tax management. It’s a little more realistic market measure.

Anne Peck: I suggest it might be interesting to look at the relationship between spreading and open interest. I’m not sure I’d want to take it out of the data, because that’s a significant percentage of speculation representing this function of permitting, in John Frazier’s example, hedges to get into those distant maturities. Therefore, it picks up an important component of the speculation required on a liquid market. But it would be very interesting to take a look at the patterns involved to see if they are related and to what they are related.

Thomas Hieronymus: I originally encountered the spreads/open interest relationship when examining the size of these markets. Every time I looked at the relationship, I’ve been shocked at how small these markets are.

Paul Farris: I take it that you believe the amount of speculation in the corn market is on the low side, and perhaps inadequate. This leads me to follow up with a couple of questions. Why would that be, and can you really say that it is inadequate in a well-developed market like corn?

Anne Peck: I don’t know whether it’s inadequate. If you accept Working’s definition of speculation or speculative index, then I think there are some problems. The index itself comes from empirical findings about the relationship between the ratio of long speculation to short hedging. First, vis-a-vis the ratio of long hedging to short hedging.

Empirically the relationship would show an index that measures the degree of speculation in each market. I was simply trying to support Tom in noting that these markets have become in the recent period much less speculative, as measured by this index, than in prior years. Indeed, there’s a minimum. It can’t go below one, and we are nearly, on average, right at one. This suggests that there may be a constraint present which is responsible for the market not growing more than it might otherwise grow. These are all very preliminary results which have fallen out very recently. They are interesting in the context of speculation versus hedging in these markets.

Paul Farris: In terms of performance of the pricing system for corn, does that really make any difference? For serving the needs of traders or discovering price in the market, does it matter that speculation is fairly low?

Anne Peck: If it is the case, and I’m not asserting that it is, that hedging has not grown more in the corn market than it already has because it’s reaching the bounds of a market that can’t accommodate for hedging given the size of the speculative contingent on that market, then it seems to me there is a pricing function it could further be performing. It might not be performing that function because it’s not reflecting all the commercial positions that might otherwise be in that market. Whether there’s a real problem there or not, I don’t know.

Francis Wolfe: Could you run any of these correlations between the speculative interest and the total open interest in the same way? What do you think that would show? In other words, I have a feeling that we’ve gone too quickly from association to causality in the discussion and I just wondered what correlations the other way would show.

Anne Peck: I did run net reporting specs as an explanatory variable to the total open interest, and it didn’t run nearly as well as net hedging. I didn’t push it the step further of going to total speculation, nor indeed worry about the nonreporting trade which in this data you have to do. So I can say, on the one hand, net speculation didn’t do nearly as well as net hedging in all of the comparisons; but I can’t tell you what the sum of speculation might have done. An appropriately defined sum of speculation has got to be identical to the sum of hedging.

William Hagerty: I’d just like to make a couple of comments as far as the speculation in corn is concerned. The profit potential is just not there. It is equivalent to back in the 1950’s when the government accumulated large supplies of corn which they could sell at will. As a result, they put a ceiling on the market and they had a floor
under the market with their price supports. You have the same situation now. The government has accumulated about 1.1 billion bushels of corn and we're looking forward to a 450 million bushel carry-over above that at the end of the year. With that in mind, there isn't much incentive for a speculator to get into the market.

Mike Martin: I hate to keep coming back to the same question, but I'm going to come back to it once more because I'm trying to pull together a whole amalgamation of half notions here. If we accept the promise that there is insufficient speculation, in this case in the corn market, and if we further accept the sort of implication that Mr. Frazier made that speculators have not necessarily better information, but different market information which somehow causes them to lead the market, then wouldn't it be fair to ask the next question which has already been asked? Namely, is the corn market not giving some sort of distorted market signals or price signals? Is there any sense of that occurring, and may that not also be the cause of the lack of speculation?

Anne Peck: To address the price forecasting performance question, the only data I've ever seen suggests that the corn market is a good forecaster of eventual spot prices in the statistical sense of being unbiased. That is historical evidence which is obviously not current evidence. The paper presented here last year by Rausser and Just from the University of California at Berkeley, suggested that the corn market, among others, was doing at least as well in its forecasting role as any of the large econometric models.

Brian Wright: I think the comments so far have shown the value of having people from the trade with the people from the universities in the same room. It seems like what's going on is that possibly there is less speculation than we would see in a market that was completely free. Mr. Hagerty's claims that there is no more profit to be made from a greater volume of speculation, given those distortions, is adequate. Perhaps that solves the puzzle.

Thomas Hieronymus: Regarding corn and the adequacy of speculation, I think the correct answer is that we simply don't know. The thrust of my comments on corn is that it is an open question and should be looked at from the point of view not, as we always have, of what is excessive speculation, but from the point of view of what is sufficient speculation. If we approach it without a negative bias toward speculation, I think we'll open up an area that really needs some investigation. The markets with which I'm familiar, the most adequately speculative market is pork bellies. The second most adequately speculative market is probably corn. I would go back to the failure of the new wheat contract. There is no question in my mind at all that it flopped because the speculators just didn't go over there and do it.

Anne Peck: We must also remember that, in the pre-1972 period, the government was much more heavily involved in all of these markets than they are now. Government involvement affects not only speculation, but it affects hedging. As John Frazier pointed out, we need to look at free supplies. If we made that comparison average today versus average pre-1972, free supplies pre-1972 would have been much smaller. The government virtually controlled the market during much of the 1950's and 1960's. Toward the end of the 1960's, they started to get out, but nonetheless caused much more significant influences I think than they do today, at least in size of position on the cash side. They may be more significant in an overhang sense of taking a much more active role by way of export embargoes, etc.

Mark Eaker: I would like to ask Dr. Hieronymus what he considers an adequate amount of speculation? How do we measure whether or not speculation has been adequate? Do we have to look at price variation or should we look at the ability of futures markets to predict the forward rate in an unbiased manner?

Thomas Hieronymus: This is an area of unknowns. You've touched on a couple of things that are important. One is price variation. Of course, that has to be netted for forecast ability of the situation. That is to say, you don't give a market as in the summer of 1979 bad marks for a major increase/decrease in price that was associated with the developing drought in Russia. So it is necessary to net it for that kind of situation. Also, I think pricing efficiency would
be one measure to look at for inadequacy, and whether that measure of variability is positively or negatively related to amount of speculation in the market. This takes it away from the risk-shifting side and over to pricing efficiency. But these things we simply don’t know, and they have not been done.

**Myron Scholes:** I have some questions about identification, and how you identify speculation and hedging interests, and whether or not the data are somewhat contaminated with resulting errors in measurement. Also, in talking about the right quantities of speculation or hedging, if one considers it to be a provision of insurance and others acquiring insurance, then you have to say whether it’s less expensive to acquire insurance other ways than using the particular futures market. If it costs you more to provide insurance by means of liquidity and transaction costs and the like, you might take other avenues. So I think that the economic benefits and costs of alternative uses of resources and provision of insurance are also important.

**Anne Peck:** On your first point, one has to recognize that during the course of this analysis reportable limits changed. For the grains they went from 200,000 bushels, for example, to 500,000 bushels. That particular change didn’t seem to affect my data at all. In fact, reported hedging continued to grow over the two-month period when limits were changed. The affect of position requirements, therefore, didn’t seem to influence the data at all. There are some residual questions about the changing definition of hedging over this 25- or 30-year period that might also be in the data to a certain extent. The grain data is probably reasonably accurate. People have been collecting it; it’s been there for a long time; it’s been examined. One doesn’t really know. Your point is well taken on the reliability of the data in the newer markets, particularly the financial markets, but probably also the case in livestock markets that I looked at. Again the data for the Maine potatoes market has also been around for a long time and greatly investigated. Probably the data is fairly reliable. The bigger question concerns the changes in the definition of hedging over this period, particularly as it affects the reporting of long hedging. Even so, changes in definition can’t explain the growth in long hedging that I saw here—from a very small component of total corn hedging, for example, to over 60 percent of the total open interest on the long side being long hedging. That simply doesn’t reflect change in definition of hedging.

**Thomas Hieronymus:** If I might, I would further muddy the water a little bit. Behind every hedge there is a speculative judgment. For example, in 1975, the rapid growth in the short hedges was undoubtedly producer selling in response to price. They formed a speculative judgment that now was the time to sell. Behind the long hedge positions was massive Russian buying. They formed the speculative judgment that now was the time to do it. This matter of hedger/speculation is not the dichotomy that we tend to think it is.

**Anne Peck:** A commercial/noncommercial interpretation makes somewhat more sense.