Emerging IP Markets: The Tokyo Grain Exchange Non-GMO Soybean Contract

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This research provides an overview of the development of the Tokyo Grain Exchange non-GMO soybean contract as an identity preserved futures contract. The development of this contract is unique, relative to the development of other new futures contracts, in that a mature conventional soybean futures contract exists. Particular attention is given to necessary conditions for development of a new futures contract. In evaluating these conditions it was determined that since inception of the Tokyo Grain Exchange non-GMO soybean futures contract, the contract functions like a mature futures contract. This is unique in comparison to results of other studies evaluating the development of futures contracts. Furthermore, the lack of a well defined and liquid cash non-GMO soybean market does not appear to hamper the development of the non-GMO futures contract. [EconLit citations: G14, M31, Q13].

Keywords: Soybeans, Emerging Markets, Identity Preservation

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1. Introduction

Identity preservation (IP) garners much attention as agricultural producers and agribusinesses seek means by which to add value to commodities. High lysine soybeans, high-oil corn, low-lenoliec soybeans, low phosphorus corn, isoflavone soybeans, and non-transgenic soybeans are just a few examples of identity preserved grains and oilseeds that were developed for a specific end-use purpose. Typically, identity preserved crops demand a market premium because of an increase in end-user value associated with quality characteristics or increased processing efficiency. Little research is undertaken to assess the market functionality of identity preserved crops. This is likely because of the lack of price information as many of these crops are marketed under contract, the terms of which are generally confidential. No U.S. futures exchange offers a futures contract for an identity preserved grain or oilseed. However, The Tokyo Grain Exchange (TGE) began offering a non-GMO soybean futures contact in May 2000. This market is traded in addition to the conventional soybean contract offered at the TGE. The objective of this research is to determine the functionality and effectiveness of identity preserved futures contracts.

The non-GMO soybean price premiums are computed as the inter-market spread, i.e., as the difference in value between the TGE non-GMO soybean futures contract and the TGE conventional soybean contract for the nearby months between May 18, 2000 and March 22, 2002[1]. Figure 1 provides a graphical summary of the TGE non-GMO soybean contract

[1] As reference to U.S. soybean prices, on March 1, 2002 the March TGE non-GMO March futures price was $5.66, the TGE March conventional futures price was $5.22, the CBOT March futures was $4.465, and the St. Louis cash bid was $4.55.

premium. Also, Table 1 provides a synopsis of the average premium value over the life of each contract traded since inception of the non-GMO contract. During initial trading of the non-GMO contract, the premium over conventional soybeans was relatively large, followed by a significant drop where the premium became negative during the expiration month of the April 2001 contract. In subsequent trading months, the premium was around $0.30/bushel. However, little is known about the functionality of this contract. For example, does the TGE non-GMO soybean contract meet the criteria of a successful futures contract and how does it compare to mature U.S. futures contracts?

Considerable attention is given to transgenic commodity issues, e.g., Heiman, Just, and Zilberman (2000); Miranowski et al.; Parcell and Kalaitzandonakes (2001); and Sparling, Turvey, and Mark (1999). Furthermore, Parcell (2001) previously outlined the specifications and performance of the TGE non-GMO soybean contract. Now that nearly two years of data exists on this contract, some fundamental understandings of the contract are reported. For instance, in April 2001, mandatory labeling of non-GMO products began in Japan. Associated with this law was the potential for levying large fines or possible jail sentences against those not meeting the stringent threshold levels to qualify for non-GMO. After the delivery period of the initial December 2000 contract, the non-GMO premium – relative to the conventional contract – became negative. Long positions were concerned about taking delivery of non-GMO soybeans that would not meet the mandatory labeling requirements to take effect in April 2001.

As noted by Pennings and Leuthold (1999), the expense of introducing a new futures contract is great, thus, understanding the factors contributing to contract viability are useful. There exists considerable research on “micro-level” and “macro-level” factors contributing to the viability of a new futures contract. Macro-level factors are factors that relate to commodity attributes (technical attributes). Micro-level factors relate to subject-level (or user-level) attributes. Both micro- and macro-level attributes are discussed in this study.

Previous research by Bollman, Thompson, Garcia (1996); Williams et al.(1998); Sanders and Pennings (1999); and Thompson, Garcia, and Wildman (1996) analyzed the functionality of new agricultural futures contracts. Bollman, Thompson, Garcia (1996) analyzed the diammonium phosphate futures contract. Williams et al. (1998) evaluated the Chinese Zhegzhou Commodity Exchange Mungbean futures contract. Sanders and Pennnings (1999) evaluated the Minneapolis Grain Exchange shrimp contract. Thompson, Garcia, and Wildman (1996) analyzed the failure of the Minneapolis Grain Exchange High Fructose Corn Syrup futures contract. The current study departs from previous studies in one important area. The non-GMO soybean futures contract represents an identity preserved commodity that is derived from a mature conventional soybean futures contract, also allowing for non-GMO soybeans to be marketed as conventional soybeans. Thus, there is always a liquid underlying cash market to arbitrage the non-GMO soybeans. This study is organized as a case study in which the functionality and effectiveness of the TGE non-GMO soybean futures contract is compared to the functionality of either a successful or failed new futures contracts, which did not develop from a mature futures contract.

As the TGE non-GMO soybean contract is still in its infancy, the term “successful commodity futures contract,” is used with caution. The manuscript is laid out as an open-ended format – much like a diary – to address the issue of whether a successful emerging identity preserved market can exist in the presence of the necessary conditions for a successful futures contract.

2. Background of TGE non-GMO Soybean Contract[2]

The Tokyo Grain Exchange (TGE) began offering a non-GMO soybean contract in May 2000. In 1999-2000, Japan imported 4.75 million metric tons of soybeans, most of these soybean imports originated in the United States. Soybeans primarily are used as inputs for Japanese food products. Thus, as the percentage of acreage planted in transgenic crops in the United States increased (Figure 2) and consumer concerns over use of transgenic crops increased, consumers and processors in Japan began sourcing non-transgenic soybeans. In addition, Japan adopted a mandatory labeling policy of non-GMO and GMO food products to begin in April 2001. A natural progression for the price discovery process for a regulated differentiated market was development of a futures market contract.

The TGE non-GMO soybean futures contract is the first such public traded commodity for a bioengineered crop. Furthermore, this contract is considered as the first public futures contract for an identity-preserved crop. Such a marketplace acts as a price discovery mechanism whereby a premium for the identity preserved crop, e.g., non-GMO soybean, is realized. The objective of this article is to introduce this contract, compare it to a conventional soybean contract traded at the TGE, present the market premium, and compare the premium offered to the cost of segregating non-GMO soybeans.

The non-GMO and conventional soybean futures contracts traded at the TGE are transacted through session trading with a single "provisional" price during the trading round. Trading is transacted via computer. Each member of the exchange is linked to the main exchange computer and an abbreviated name of each member appears on the screen for everyone to see. Exchange members indicate the number of buy and/or sell orders and these appear on the

[2] This section was excerpted nearly verbatim from Parcell (2001)

screen next to their name. As an initial "provisional" price is displayed, members determine whether to stay in the market or exit the market with a counter order. The "provisional" price is fixed when the quantity of sell orders equals the quantity of buy orders. If the initial "provisional" price offered does not cause equilibrium to occur, then the exchange operator changes the price until sell orders equal buy orders. For example, if the number of buy orders exceeds the number of sell orders by 50 (appears at 50+ on the screen) then the exchange operator will increase the price incrementally until the number of sell orders equals the numbers of buy orders. This process occurs for every trading month offered for the contract consecutively from the contract closest to expiration to the furthest deferred contract.

Table 2 highlights the difference in contract specifications between the TGE conventional and non-GMO contracts. There are five primary contract specification and exchange requirement differences. First, the contract size for the non-GMO contract is one-third of the size of the conventional contract (10,000 kg versus 30,000 kg). Second, the position limits for the non-GMO contract is three times larger than the conventional contract. This effectively allows hedgers of non-GMO soybeans to deliver or take delivery of an amount similar to the conventional soybean contract that is three times the contract size. Third, the contract grades are slightly different locations of U.S. origin. Fourth, deliverable quality grades are different. Fifth, the initial margin for the non-GMO contract is 25,000 yen compared to 70,000 yen for the conventional contract. The initial margin for the non-GMO contract is greater than one-third the size of the conventional. This likely is due to the perceived greater volatility in the non-GMO market. However, similar initial margin requirements are true of mini and full contracts traded in the United States.

3. A Successful Futures Contract?

Various researchers (e.g., Black, 1986; Gray, 1978; Hieronymus, 1996; and Leuthold, Junkus, and Cordier, 1989) note necessary conditions for a successful commodity futures contract. Table 3 lists these necessary conditions, assesses to what extent the TGE non-GMO soybean contract meets the respective condition, and provides evidence for meeting the listed condition. Because this market represents an emerging identity preserved commodity futures market contract, the focus of this research lies with discussions of the seven conditions listed in Table 3. The following seven sub-sections highlight the suggested necessary conditions.

3.1 Economic Need

Economic need is different from economic justification. Bullock, Desquilbet, and Nitsi (2001) evaluated economic justification for producing non-GMO crops, while others, e.g., Lusk et al. (2001), show the economic justification for marketing non-GMO products. As the percentage of non-GMO U.S. soybean acres declines (Figure 2) supply of non-GMO soybeans tightens. The demand for non-GMO soybeans in Asia is evident with the development of trade issues, and Bredahl documents processor demand for non-GMO inputs in the European Union. Thus, antidotal evidence indicates an economic need for the TGE non-GMO contract. The presence of the non-GMO soybean premium (Figure 1) is sufficient evidence to indicate economic need.[3] A look at the TGE non-GMO soybean contract deliveries may provide more insight.

[3] Furthermore, the presence of premium volatility (see Figure 8) ensures economic justification since a constant premium level indicates that non-GMO soybean hedgers could cross-hedge in the conventional soybean contract.

While it is difficult to assess directly the number of speculators and hedgers in this market, some generalities are made when relating the delivered quantity to the maximum open interest over the contract life (Williams et al., 1998). For the TGE non-GMO soybean futures contract, the February and April 2002 contracts realized deliveries less than 1% of the maximum open interest of the contract life. This percentage is similar to that observed for the TGE conventional soybean contract. Also, this percentage is similar, if not below, ratio levels observed with commodities traded on the CBOT. This indicates that there were not disproportionate deliveries to maximum open interest as compared to mature futures contracts.

As the TGE non-GMO contract size is 10 metric tons (366.67 bushels), delivery of 117 lots on the February 2002 contract indicates that 43,000 bushels of U.S. origin non-GMO soybeans traded hands in Japan.[4] This is in comparison to the 249,000 bushels of U.S. origin conventional soybeans delivered on the February 2002 conventional soybean contract. Assuming that the proportion of Japanese users of non-GMO and conventional soybeans is similar to the proportion of hedged product, this indicates that 15% of the Japanese market is for non-GMO soybeans. Using 1999-2000 import data, a 15% share of the Japanese soybean import market indicates a potential demand for 600,000 metric tons (22 million bushels) of non-GMO soybeans.

3.2 Well Written Contract (*Contract Specification*)

Contract provisions are important to the success of a futures contract (Powers, 1967). Every transaction has three basic elements: the allocation of value, the allocation of risk, and the

[4] For the April 2002 contract, 150 non-GMO soybean contracts and 173 conventional soybean contracts were delivered on. This information became available after the data for the rest of this study was collected.

allocation of decision rights (Sykuta and Parcell, 2000). Allocation of value is the distribution of gains from trade. Allocation of risk is subjecting value to uncertainty. Allocation of decision rights is the assignment of tasks in meeting the terms of trade. In general, the contract specifications (see Table 2) are similar between the TGE conventional and non-GMO soybean contracts.

Allocation of value is specified through arbitrage on the TGE. Thus, market forces determine allocation of value. For the current study, the allocation of risk and value are discussed together in relationship to a successful futures contract. Allocation of risk, beyond typical futures contract production risk, is derived from the delivery grade contract specification. As noted by Thompson, Garcia, and Wildman (1996), the futures contract must be a close substitute for the underlying cash product. The written specifications of the TGE non-GMO soybean contract provide sellers (those having the right to deliver) with considerable leeway in the quality delivered. For an identity preserved market, quality is essential. Why? Identity preserved production is used for specific purposes, whereas, commodity production has various uses. Most of the non-GMO soybeans in Japan are for food use (Nill, 2000). Thus, the qualities beyond the primary characteristic, non-GMO, are essential to the usefulness of the good. During the initial delivery periods of the non-GMO contract, there was concern by long positions of taking delivery of non-GMO soybeans that were of so poor quality that they could not be used as intended (Nill, 2000). Furthermore, the specifications are vague regarding the tolerance level of percent of conventional soybeans in a deliverable lot of non-GMO soybeans. Preceding mandatory labeling laws taking effect in April 2001, a tolerance level of 5% took effect for labeling "GMO Free" and a civil penalty levied for inappropriately claiming "GMO Free," the non-GMO premium became negative. That is, because the potential existed for Japanese firms to take delivery of non-GMO soybeans that did not meet labeling standards, owning non-GMO soybeans became an economic bad. Selling off began and the non-GMO soybean contract discounted relative to the conventional soybean contract.[5]

The Tokyo Grain Exchange determined allocation of decision rights when it established the non-GMO contract specifications. The contract size of the non-GMO contract is one-third the size of the conventional contract, however, this difference seems plausible for a niche market situation, i.e., smaller, higher valued volumes being transacted. Thus, allocation of decision rights between buyer and seller appears fair based on relative performance of the non-GMO contract to the conventional soybean contract, which trades under similar conditions. Optimal allocation of decision rights is due likely to the use of warehouse delivery in transferring deliverable quantities. Williams et al. (1998) contributed some of the success of the Chinese Mungbean contract to warehouse delivery.

The non-GMO futures contract has a delivery period that begins one day prior to contract expiration. This contract specification does not appear to hamper delivery. In contract, Williams et al. (1998) contributed a portion of the Mungbean futures contract success to a delivery window beginning the first day of the contract expiration month. U.S. grain and oilseed futures contacts allow for first delivery at the beginning of the contract expiration month. Findings of current research suggest that the specified length of delivery window may be less important than previously hypothesized.

[5] Also occurring during this time was a significant run up in the price of the conventional soybean contract relative to the non-GMO contract price. This price increase is attributed to trade discussions regarding the limitation of U.S. soybean imports into Japan.

3.4 Well Defined and Liquid Underlying Cash Market

A well-defined and liquid underlying cash market is important for assessing pricing effectiveness of the market (Black, 1986; Gray, 1978; Hieronymus, 1996; Leuthold, Junkus, and Cordier, 1989; Williams et al., 1998). The spot market for non-GMO soybean price information is thin. Harvest delivery or buyers call non-GMO production contracts, e.g., those offered through Optimum Quality Grains, often specify a fixed premium. Thus, analyzing the ability for spatial arbitrage between the spot and futures price, to ascertain the thickness of the cash market, is impractical for this analysis. The problem of lacking non-GMO soybean spot price information to analyze spatial arbitrage effectiveness is addressed by applying the methodology used by Williams et al. (1998) in assessing the arbitrage potential in the China Zhegzhou Commodity Exchange Mungbean futures contract.

Instead of using spatial price relationships to analyze arbitrage effectiveness, Williams et al. (1998) used temporal price spreads, i.e., between contract months, to analyze arbitrage effectiveness by comparing the percentage difference in price across contracts to the carrying charge expressed as a percentage of price.[6] The conceptual framework is used here to analyze arbitrage opportunities. The typical cost of carry in the non-GMO soybean market is around 4% to 5% over a two-month period.[7]

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[6] Thompson, Garcia, and Wildman (1996) analyzed inter-temporal arbitrage in the High Fructose Corn Syrup contract using price levels.

[7] A conventional soybean contract results in a cost of carry of approximately 2.5% over a two month period, however, as shown by Maltsbarger and Kalaitzandonakes (2000) the costs associated with storage of identity preserved grains/oilseeds are considerably greater than for conventional grains/oilseeds.

Thompson, Garcia, and Wildman (1996) found a significant inverse carrying charge for intertemporal arbitrage opportunities in the High Fructose Corn Syrup futures contract, but they attributed the inverse carrying charge to seasonality. Williams et al. (1998) found a lack of intertemporal arbitrage toward the inception of the Mungbean futures contract, but as the contract matured the intertemporal arbitrage increased. For the current study, Figure 3 shows a series of figures depicting the percentage spread between the current contract month and next deferred contract for the TGE non-GMO soybean contracts traded since contract inception on May 18, 2000. Except for a few of the contracts near expiration, the arbitrage value is below the estimated cost of carry in the non-GMO soybean market. There were periods of inverse carrying charges. Inverse carry charges indicate that current demand is greater than future demand, and provide little incentive to hedge stocks (Thompson, Garcia, and Wildman, 1996). Yet, for the current study, any significant inverse carrying charge was observed during the first few months of current contract trading or near the end of trading. The most noticeable market based inverse carrying charge was for June 2001 delivery relative to April 2001. This inverse carrying charge possibly was an anomaly associated with the establishment of the mandatory GMO-free labeling law in Japan. Periods of arbitrage occurred near the end of each contract trading period, suggesting that hedgers may be concerned with delivery or storage – sustaining quality. Williams et al. (1998) found a similar result for the Mungbean futures contract. Effective arbitrage in the TGE non-GMO soybean contract occurred much earlier in the life of the contract than for new futures contracts (e.g., Mungbean futures contract and High Fructose Corn Syrup futures contract).

3.5 Competitive Market Place

A Walrasian (competitive) market exists where sellers and buyers take prices as given, cannot influence prices, and agents maximizes their objective function subject to the usual constraints so that the market is cleared in trade amongst each other. In the previous section I argued the inter-temporal arbitrage across contracts suggests the presence of a competitive market place. This section expands on the previous section to assess whether this market conforms to the theory of a niche market that exhibits potential to market in a substitute market, i.e., convention TGE soybean futures contract.with some substitutability with a conventional market.

Lence and Hayes (2001) show that when buyers (consumers) are willing to pay a premium for non-GMO soybeans, the market price for conventional soybeans should decrease to entice consumers to switch from non-GMO soybeans to conventional soybean consumption. Following the methodology of Lence and Hayes (2001), an increase in non-GMO soybean contract price (demand increasing relative to supply) should lead to a short-term decline in the price of the conventional soybean contract. This hypothesis is tested using a Vector Autoregressive (VAR) procedure to derive impulse response functions from a shock in the non-GMO soybean price level. This allows for assessing the size of the effect and the length of run of the effect to be assessed.

The VAR model used here is a relatively simple empirical application.[8] The data used is from the nearby non-GMO and conventional TGE soybean contract from May 18, 2000 through March 22, 2002. The VAR model estimated is of the form:

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[8] A more advanced model incorporating the level of premium could be modeled, i.e., when the premium is greater than the cost of identity preservation. For instance, Goodwin and Piggott (2001) incorporated threshold effects into regional grain marketing dynamics.

(1) $$Y_j(t) = a_{1j} \bullet \text{Constant} + \sum_{i=0}^{i=k} a_{ij} \bullet X_j(t-i)$$

Where, Y(t) is the dependent variable and X(t-i) is the explanatory variable lagged *i* periods.[9]

Figure 4 graphically represents the response to the conventional contract from one standard deviation in the non-GMO soybean contract price. Results indicate that the conventional soybean contract price declines initially, as hypothesized by Lence and Hayes (2001), and then price readjusts. Since only the nearby contract is used, the length of time required to return to equilibrium is overstated most likely. This is one additional indication that the non-GMO soybean contract appears to behave competitively relative to the conventional soybean contract, i.e., conform to theory.

3.6 Cross-Hedge Liquidity

Liquidity is a key factor in assessing the ability to hedge in a futures market. Pennings and Meulenberg (1997) and Thompson, Garcia (1996) argue that in the presence of thin markets substantial transaction costs may be incurred. Incorporating transaction costs into the Ederington measure of hedging effectiveness, Pennings and Meulenberg (1997) find the risk minimizing hedge ratio is of the form:

(2) $$\beta^* = \frac{\sigma_{sf} - \sigma_{smd}}{\sigma_f^2 - \sigma_{md}^2 - 2\sigma_{fmd}}$$

Where, σ's represent the usual variance or covariance terms, *s* represents spot price, *f* represents futures price, and *md* represents transaction costs. With no market depth, equation (2) reduces to

[9] A lag length of six was chosen by minimizing the Akaike Information Criteria, and neither stationarity or ordering tests were performed.

the standard risk minimizing hedge ratio. No cash price series exists for non-GMO soybeans; therefore, ascertaining the level of market liquidity in relation to transaction costs is difficult when using traditional methods like specified in equation 1.

Figure 5 indicates the TGE non-GMO soybean nearby contract volume and open interest since inception of the contract. The volume and open interest patterns shown are similar to those patterns observed in established futures markets. A month or two prior to contract expiration volume and open interest are relatively large. As contract expiration approaches, both volume and open interest decline. The overall number of non-GMO soybean contracts traded is similar – in quantity of bushels transacted – to the conventional soybean contract (Figure 6). That is, a ratio of less than, or equal to one-third indicates that more bushels of non-GMO soybeans were transacted than bushels of conventional soybeans.

As a proxy for establishing cross-hedging liquidity via equation 2, the nearby contract volume to open interest ratio is computed (Figure 7). Tilley and Campbell (1988) employ such a variable in capturing the ability of hedgers and speculators to enter or exit the market, in analyzing factors affecting Hard Red Winter Wheat basis patterns. The ratio of volume to open interest generally is similar to that for mature U.S. commodity futures contracts. Furthermore, TGE non-GMO soybean February 2002 contract delivers were 8% of the maximum open interest for the expiration month. The TGE conventional February 2002 contract deliveries were 18% of the maximum open interest for the expiration month. Non-GMO contract deliveries as a percentage of maximum open interest in the expiration month are similar to that reported by Williams et al. (1998) and for mature future contracts in the U.S.

3.7 Price Volatility and Ability to Attract Speculators

Futures price volatility is critical to attract speculators and to add liquidity to the market. Figure 8 summarizes the 10-day moving average price coefficient of variation for the conventional, non-GMO and inter-market spread (premium). The coefficient of variation for the non-GMO and conventional soybean contract price is similar to that observed for mature U.S. contracts. Yet, the coefficient of variation for the non-GMO soybean contract is similar to that for the conventional soybean contract. As shown in the previous section, significant liquidity exists in the non-GMO soybean market. These factors indicate that the conditions to entice speculators into this market are present.

3.8 Residual Basis Risk

Given that no spot market price information for non-GMO soybeans exists, assessing residual basis risk is difficult. One measure of residual basis risk is the spread between the non-GMO and conventional contract. As illustrated in Figure 8, the spread between contracts exhibits considerable variability relative to either individual contract. This indicates a hedger cannot effectively use the conventional TGE soybean contract to hedge non-GMO soybean stocks. This is an important characteristic of an identity preserved futures contract in that inter-market spread volatility suggests economic need.

4. Implications for Identity Preserved New Futures Contracts

There is a relatively thin research base from which to derive the empirical foundations for Irwin's (1954) research analyzing the functionality of emerging identity preserved futures contract. More often, as of late, agricultural economists find themselves attempting to explain the impact of thin cash markets and the impact on futures markets because of thin cash markets. Yet, the TGE non-GMO soybean contract arose from a truly thin market, i.e., the difficulty in attaining private or public non-GMO soybean price information. The origination and sustained trading volume (Figure 9) in the TGE non-GMO soybean futures contract suggests futures markets can survive in the face of an increasing contract focused agricultural marketing sector (delivery on contracts suggests hedging is taking place in the contract). As noted by Williams et al. (1998) for the Mungbean futures contract, the non-GMO futures contract also may stimulate the growth of a non-GMO spot market.

Relative to other new futures contracts, volume in the non-GMO soybean contract has sustained. Why? Possibly because producers and processors of soybeans, relative to other commodities, are more experienced in using futures markets. Schroeder et al. (1998) finds grain/oilseed producers are more likely to use futures than livestock producers. According to the April 2, 2002 Commodity Futures Trading Commission commitment of trader reports, grain/oilseed commercials held four times as many futures positions as did livestock commercials. In general there is an economic need for this futures contract.

As noted by Lacroix and Varangis (1996) and Williams et al. (1998), allocation of value in quality attributes partially is off set by the commodity exchange when warehouse delivery is required of the commodity. As is detailed in Table 2, the non-GMO contract specification indicates warehouse delivery. Thus, contract specification for a quality-based product may require warehouse delivery, and receipt, to be successful. However, the length of delivery period may not need to be as long as once hypothesized.

Considerable research exists that explains the process of market breakdowns when goods of differing quality are marketed (and asymmetric information exists about these qualities). This concept is better known as the "market for lemons." Ultimately, to address allocation of risks and value between trading partners (two of the three aspects of terms of trade) the TGE non-GMO contract specification may need tweaking to align with regulatory policy.[10]

Thin markets lead to market power by the buyer or seller, and asymmetric quality information leads to inefficient markets, which may especially be true for thinly traded product futures contracts. The non-GMO futures contract has sufficient liquidity and volume to attract hedgers, price volatility to attract speculators, and its arbitrage patterns are consistent with mature futures contracts. Furthermore, this study refutes Irwin's (1954) argument that new futures contracts develop slowly. Williams et al. (1998) observed the Chinese Mungbean futures contract developed over a two to three year period. The TGE non-GMO soybean contract developed quickly. This is due most likely to the growth of this contract from the TGE conventional soybean contract.

The TGE non-GMO soybean contract has potential to become a successful futures contract. A likely contributing factor to this is the emergence of the non-GMO soybean contract from the mature TGE conventional soybean contract. Thus, development of U.S. futures contract for identity preserved commodities may have the greatest success when aligned with mature contracts. An economic need, of course, supercedes any other attribute of a successful futures contract. Table 3 summarizes the findings of this study in relationship to the seven initial

[10] To date, no specification changes occurred with the TGE non-GMO soybean contract. Japanese businesses transact business primarily through trust and relationships, i.e., culture, so that non-GMO soybean futures contract are likely enforced explicitly. Effectiveness of U.S. origin IP contracts may require implicit specification changes.

necessary criteria listed for a successful futures contract. The criteria in Table 3 are listed (ranked) according their contribution to the development of a successful futures contract. "Sufficient" as opposed to "necessary"

This is a case study of information impacts and price integration issues related to the start-up of the Tokyo Grain Exchange Non-GMO soybean futures contract. Understanding the functionality of such markets may assist persons in better understanding how U.S. futures markets for quality based commodities may be established. Furthermore, information is garnered about the futures market price discovery effectiveness in the presence of thin cash markets.

References

Black, D.G. "Success and Failure of Futures Contract: Theory and Empirical Evidence." Monograph Series in Finance and Economics, 1986-1, Salomon Brothers Center for the Study of Financial Institutions, Graduate School of Business Administration, New York University, 1986.

Bollman, K.,S. Thompson, and P. Garcia. "An Analysis of the Performance of the Diammonium Phosphate Futures Contract." NCR-134 Conference, Applied Commodity Price Analysis, Forecasting, and Market Risk Management, Proceedings, 1996, pp.388-401.

Bredahl, Maury E. "Consumer Acceptance of Genetically Modified Foods: Consumer Preferences In the United Kingdom Food Sector: A Survey of Food Processors." Research Report, Center for International Trade Studies, University of Missouri. 2002.

Bullock, D.S., M. Desquilbet, and E.E. Nitsi. "The Economics of Non-GMO Segregation and Identity Preservation." Department of Agricultural Economics, University of Illinois working paper. Obtained via Internet download, 2001, (http://www.ace.uiuc.edu/Faculty/bullock/bullock_papers.html).

Ederington, L.H. "The Hedging Performance of the New Futures Markets." *Journal of Finance* 34 (1979):157-70.

Gray, R.W. "Why Does Futures Trading Succeed or Fail: An Analysis of Selected Commodities." *Readings in Futures Markets: Views from the Trade*. Edited by A.E. Peck, Chicago Board of Trade, 1978.

Goodwin, B.K., and N. Piggott "Spatial Market Integration in the Presence of Threshold Effects." *American Journal of Agricultural Economics* 83(2) (May 2001):302-318

Heiman, A., D.R. Just, and D. Zilberman. "The Role of Socioeconomic Factors and Lifestyle Variables in Attitude and the Demand for Genetically Modified Foods." *Journal of Agribusiness* 18 (Fall 2000):249-260.

Hieronymus, T.A. "The Desirability of a Cattle Futures Market." *A Revisionist Chronology of Papers by T.A. Hieronymus*. Edited by T.A. Hieronymus, Office for Futures and Options Research, University of Illinois, 1996.

Irwin, H.S. (1954): Evolution of Futures Trading. Madison, WI: Mimir Publishers.

Kalaitzandonakes, K. "A Farm Level Perspective on Agrobiotechnology: How Much Value And For Whom?" *AgBioForum* 2(Spring 1999): http://www.agbioforum.missouri.edu/

Lacroix, R., and P. Varangis. "Using Warehouse Receipts in Developing and Transition Economies," *Finance and Development*. (September 1996):36-39.

Lence, S., and D. Hames. "Response to an Asymmetric Demand for Attributes: An Application to the Market for Genetically Modified Crops." Presented paper at NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, ed. T.C. Schroeder, Dept. of Ag. Econ., Kansas State University, 2001. Retrieved via Internet download (http://agecon.lib.umn.edu/cgi-bin/pubview.pl?pubid=21).

Leuthold, R.M., J.C. Junkus, and J.E. Cordier. *The Theory and Practice of Futures Markets*. Lexington, Massachusetts. Lexington Books, 1989.

Lusk, J.L, M.S Daniel, D.R. Mark, and C.L. Lusk. "Alternative Calibration and Auction Institutions for Predicting Consumer Willingness to Pay for Nongenetically Modified Corn Chips." *Journal of Agricultural and Resource Economics* 26 (2001)-40-57.

Maltsbarger, R., and N. Kalaitzandonakes. "Study Reveals Hidden Costs in IP Supply Chain." *Feedstuffs* August 28, 2000

Miranowski, J.A., G. Moschini, B. Babcock, M. Duffy, R. Wisner, J. Beghin, D. Hayes, S. Lence, C.P. Baumel, and N.E. Harl . "Economic Perspectives on GMO Market Segregation." Iowa State University Departmental Paper. Obtained via Internet download (http://www.econ.iastate.edu/outreach/agriculture/).

Nill, K. Deputy Director, American Soybean Association International Marketing Staff, Personal Communication, November 2000.

Pennings, J.M.E., and R.M. Leuthold. "Commodity Futures Contract Viability: A Multidisciplinary Approach." Presented paper at NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, ed. T.C. Schroeder, pp. 413-424. Dept. of Ag. Econ., Kansas State University, 1999.

Pennings, J.M.E., and M.T.G. Meulenberg. "The Hedging Performance in New Agricultural Futures Markets: A Note." *Agribusiness*: *An International Journal* 13(1997):295-300.

Parcell, J.L, N. Kalatizandonakes, and L. Marks. "The Response of Corn Futures Market Prices to Firm Non-use Announcements of Inputs with Transgenic Traits." *Journal of Agricultural and Resource Economics* 26 (December 2001):569.

Parcell, J.L. "An Initial Look at the Tokyo Grain Exchange Non-GMO Soybean Contract." *Journal of Agribusiness* 19, no. 1 (Spring 2001): 85-92.

Powers, M.J. "Effects of Contract Provisions on the Success of a Futures Contract," *Journal of Farm Economics*, 14 (1967):833-43.

Sanders, D.R., and J.M.E. Pennings. "They Trade Shrimp in Minneapolis? An Examination of the MGE White Shrimp Futures Contract." Presented paper at NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, ed. T.C. Schroeder, pp. 273-88. Dept. of Ag. Econ., Kansas State University, 1999.

Schroeder, T.C., J.L. Parcell, T.L. Kastens, and K.C. Dhuyvetter. "Perceptions of Marketing Strategies: Producers vs. Extension Economists." *Journal of Agricultural and Resource Economics* 23 (1998):279-293.

Sparling, D., C.G. Turney, and D. Mark. "GMOs – What are They and What Do They Mean for Producers and Lenders? Biotechnology Opportunities and Risks in Agriculture." *Agricultural Finance Review* 59 (1999):1-18.

St. Louis Federal Reserve Bank. "Exchange Rates." Obtained via the Internet at: http://www.stls.frb.org/fred/, December 2000.

Sykuta, M., and J.L. Parcell. "Contract Structure and Design in Identity Preserved Grain Production." *American Journal of Agricultural Economics*, Published On-line [www.agecon-lib.umn.edu], August 2000

Thompson, R.R., P. Garcia, and D.L. Wildman. "The Demise of the High Fructose Corn Syrup Futures Contract: A Case Study." *Journal of Futures Markets*, 16 (1996):697-724

Tilley,S., and S. K., Campbell. "Performance of the Weekly Gulf-Kansas City Hard-Red Winter Wheat Basis." *American Journal of Agricultural Economics* 70 (1988):929-935.

United States Department of Agriculture. "Acreage." *National Agricultural Statistics Service*. June, 2000.

__________________. "Crop Production--Prospective Plantings." *National Agricultural Statistics Service*. March, 2002.

Williams, J. A. Peck, A Park, and S. Rozelle. "The Emergence of a Futures Market Mungbeans on the China Zhengzhou Commodity Exchange." *Journal of Futures* 18 (1998): 427-48.

Figure 1. Non - GMO soybean premium computed as the difference between the TGE non-GMO and conventional soybean price quote off the nearby contract (5/18/00 through 3/22/02)

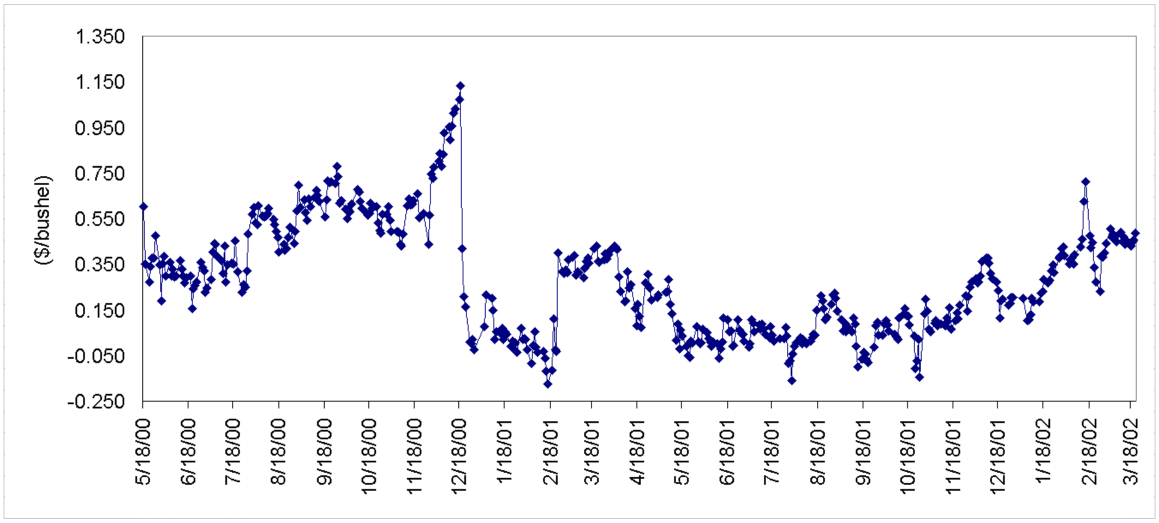


Figure 2. Rate of adoption of bioengineered crops in the United States (source: USDA)

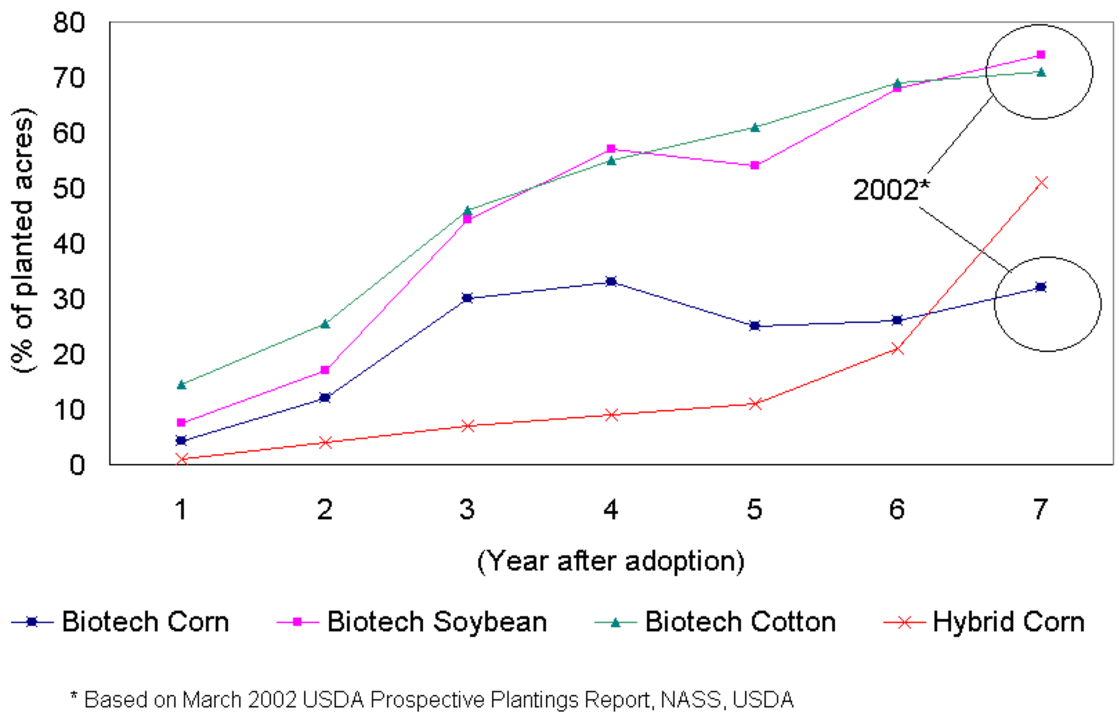


Figure 3. Percentage price spread between current futures contract and next deferred futures contract.

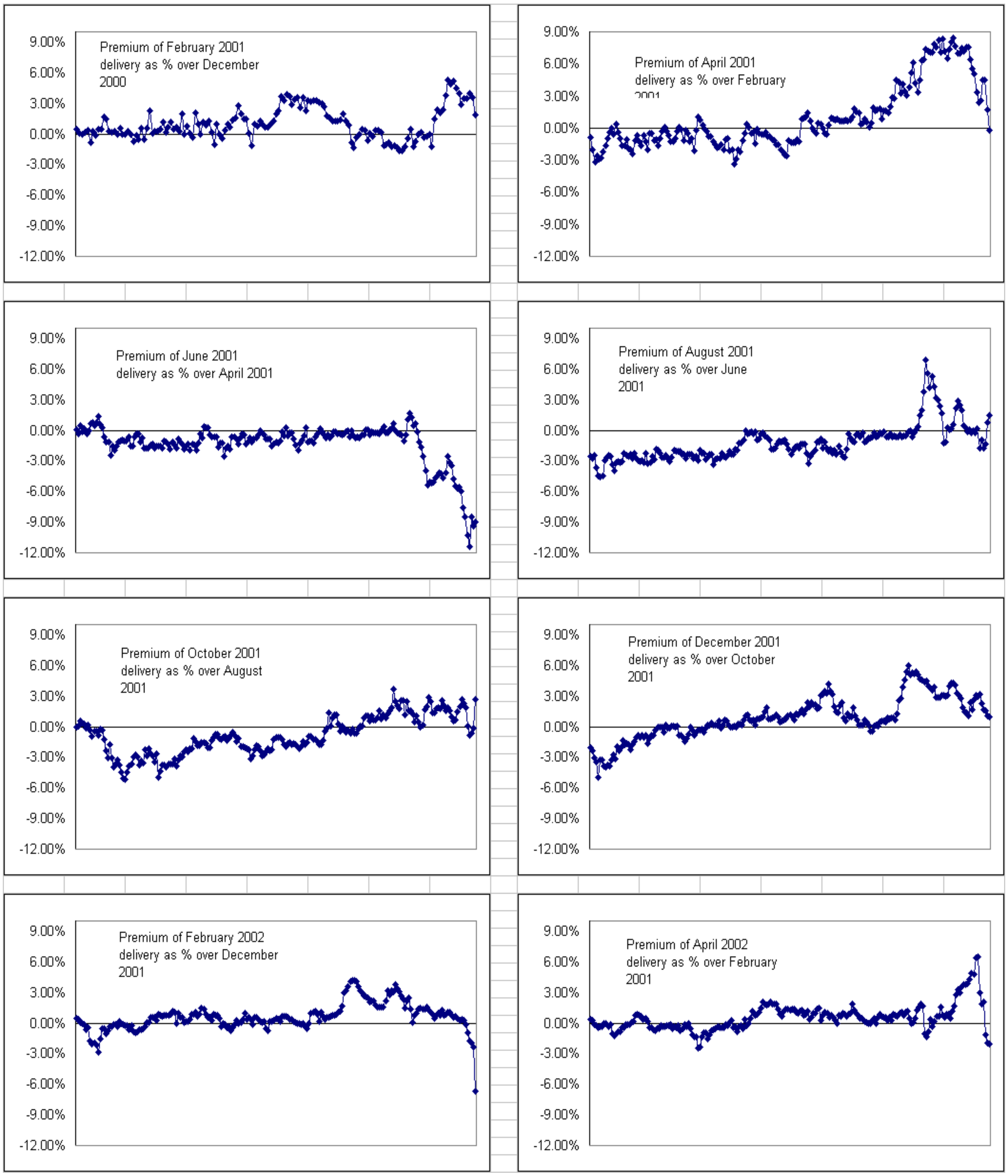


Figure 4.

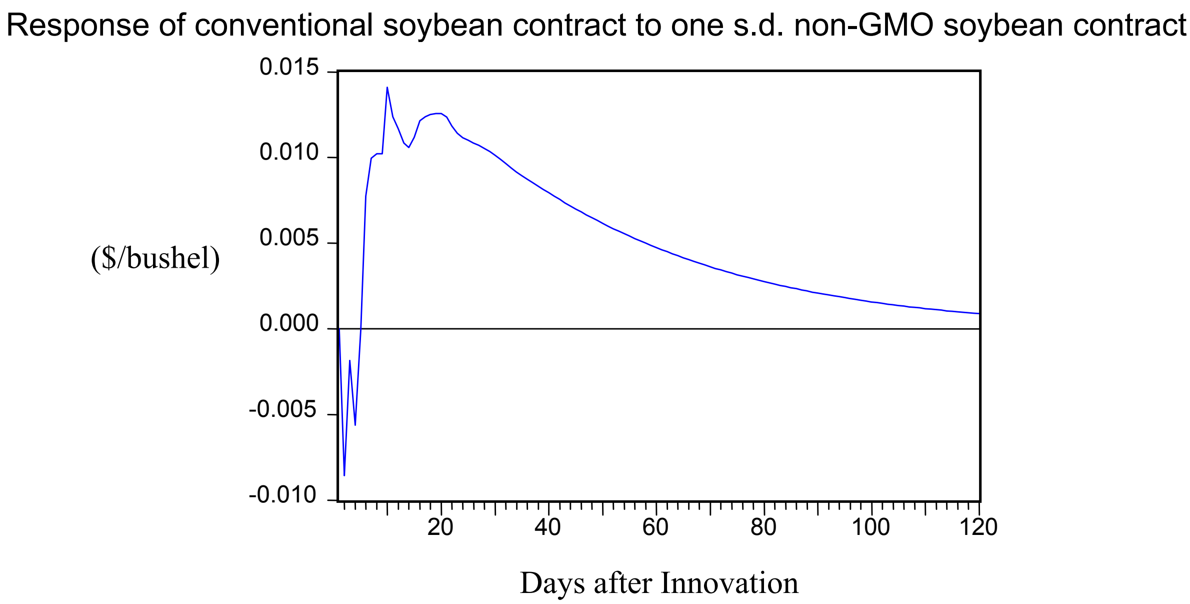


Figure 5. Nearby TGE non-GMO contract volume and open interest.

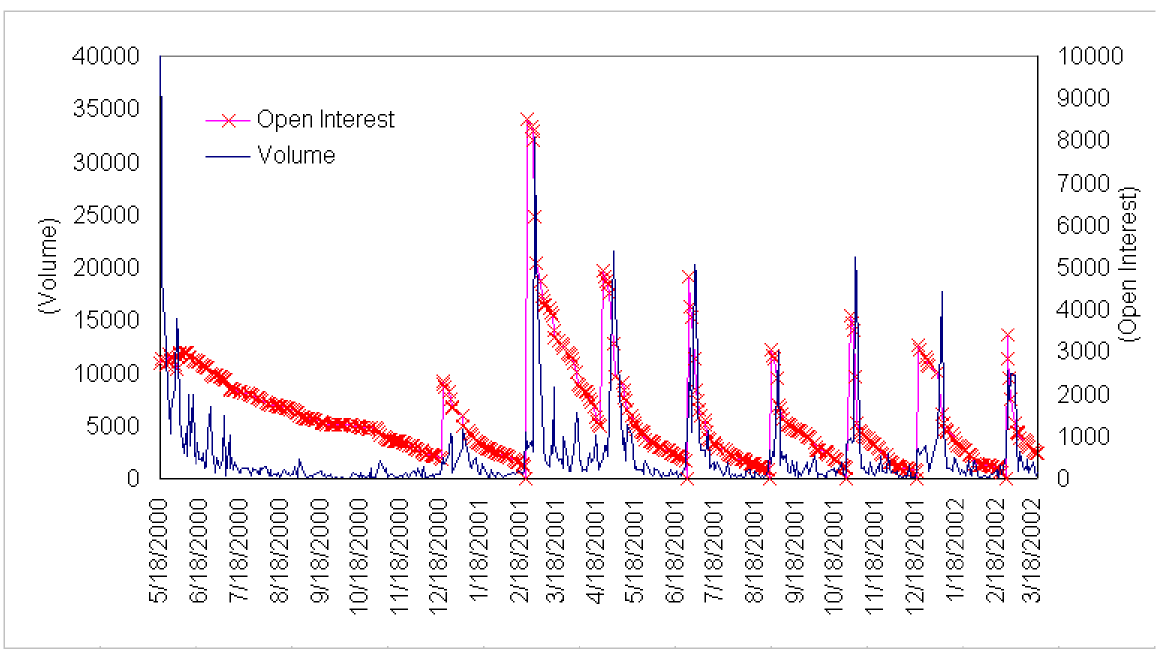


Figure 6. Ratio of volume of conventional to non-GMO TGE contract (December 2001 contract)

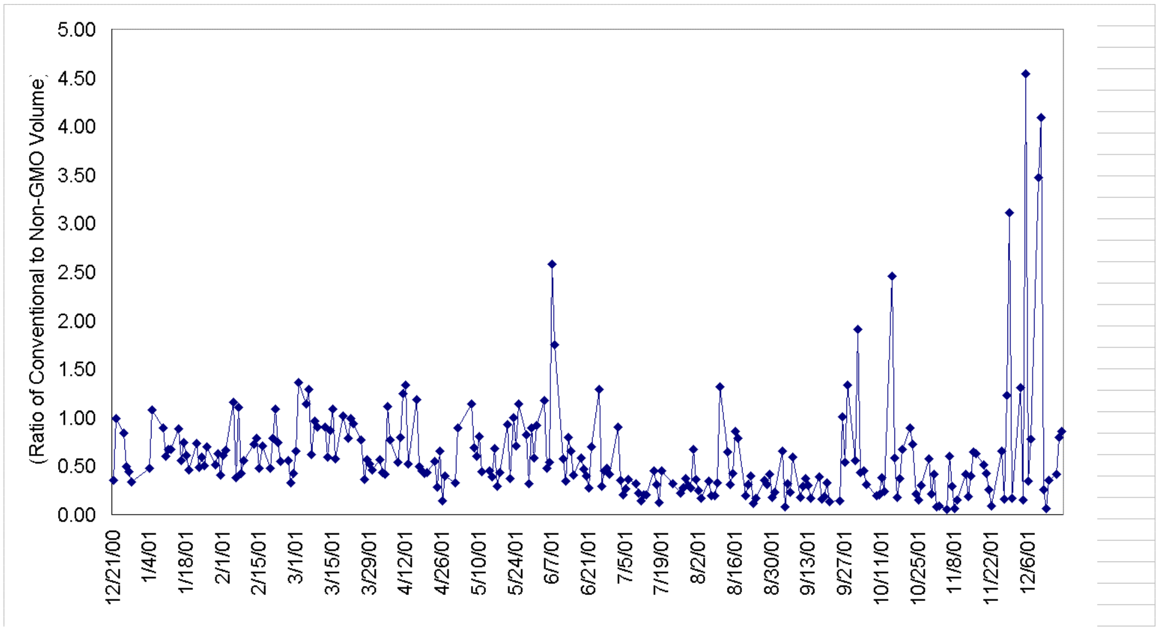


Figure 7. Ratio of nearby TGE non-GMO soybean contract volume to open interest, since inception of contract.

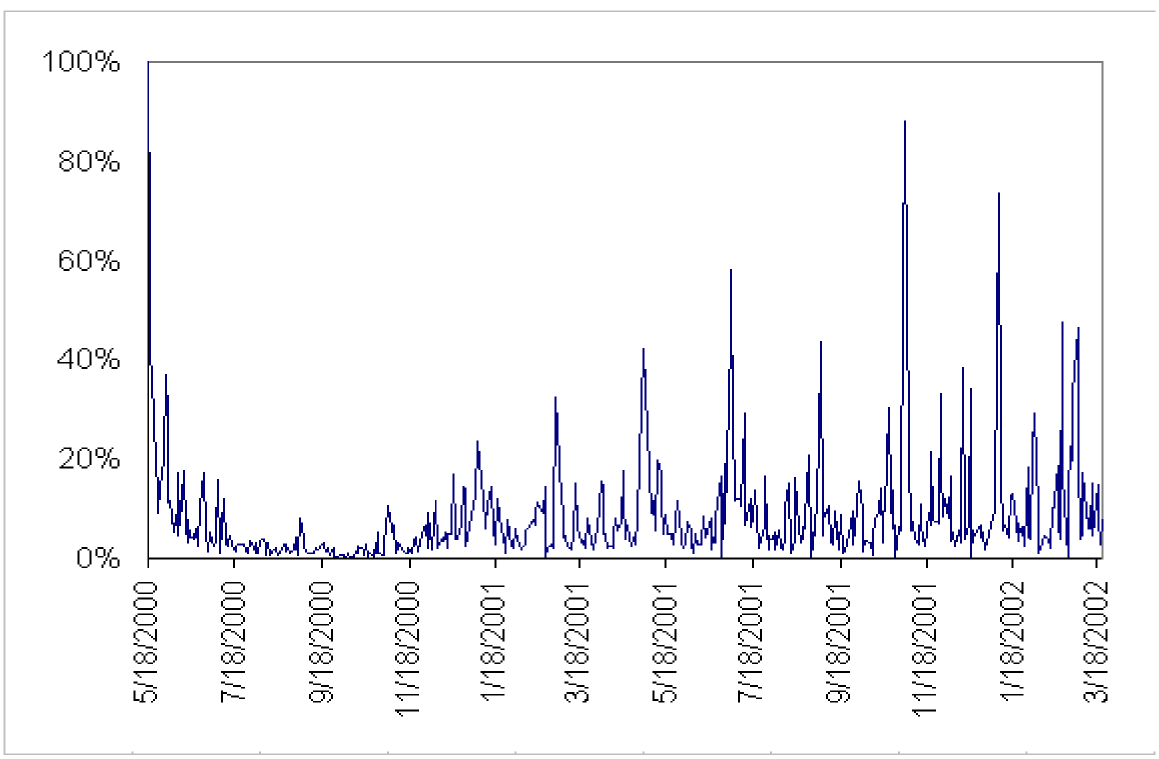


Figure 8. Ten-day TGE moving coefficient of variation for non-GMO Premium, non-GMO contract, and conventional soybean contract (December 2001 contract).

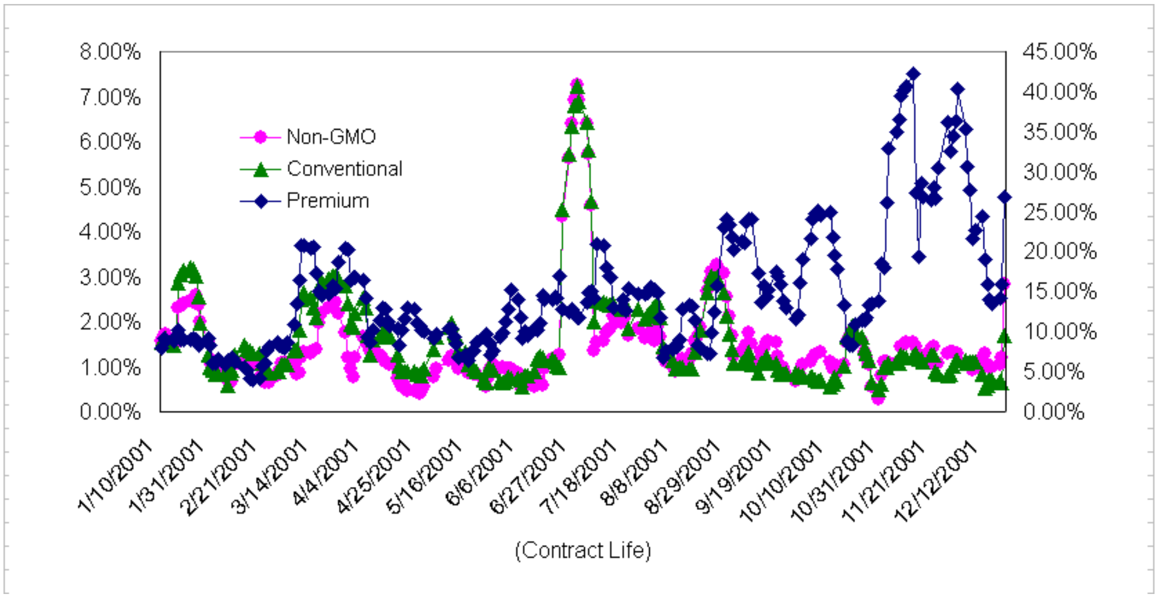
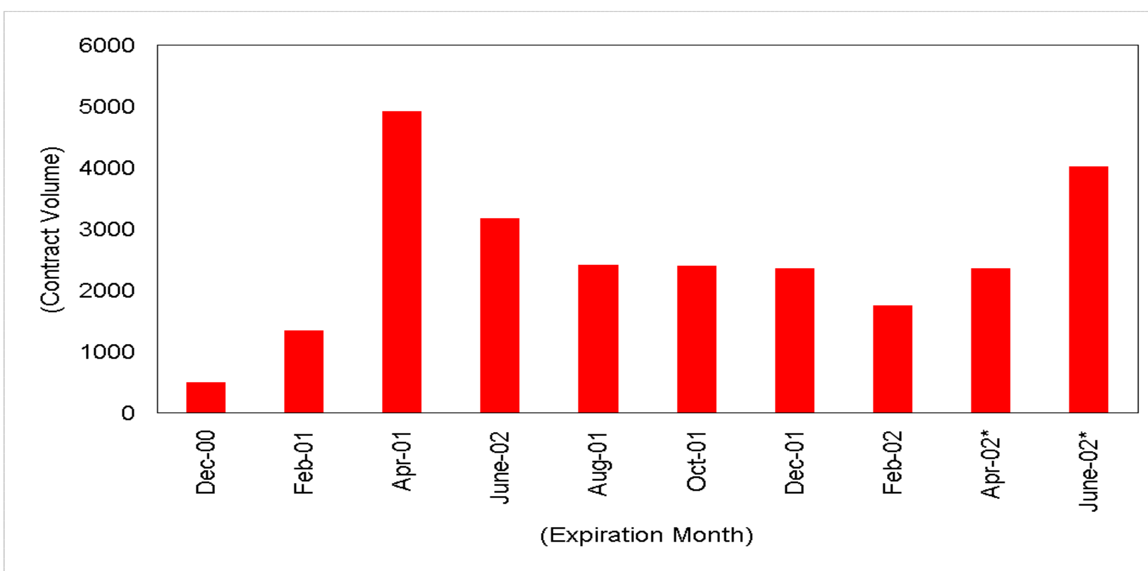


Figure 9. Average daily TGE non-GMO soybean trading volume over the life of the various contract months.



note: * indicates contract has not yet expired

Table 1. Summary statistics of non-GMO premiums ($/bushel)

	Calendar Year		
Contract Month	**2000**	**2001**	**2002**
February	N/A	$0.28 ($0.16)	$0.31 ($0.07)
April	N/A	$0.36 ($0.31)	$0.31* ($0.06)
June	N/A	$0.29 ($0.14)	$0.28* ($0.04)
August	N/A	$0.29 ($0.17)	$0.28* ($0.03)
October	N/A	$0.29 ($0.17)	$0.29* ($0.03)
December	$0.53 ($0.19)	$0.29 ($0.11)	$0.31* ($0.04)

Note, value in parentheses ( ) is the premium standard deviation over the life of the contract
* As of 3/22/2002

Table 2. TGE contract specifications

	Conventional Soybeans	Non GMO Soybeans
Launched	March 1984	May 2000
Contract Size	30,000 Kg / 1180 bu.	10,000 kg / 392 bu.
Delivery Months	February, April, June, August October, December within a 12 month period	Same as conventional
Price Quotation	Yen per 1,000 kg	Yen per 1,000 kg (100 yen per contract)
Minimum Price Fluctuation	10 yen per 1,000 kg (300 yen per contract)	10 yen per 1,000 kg (100 yen per contract)
Maximum Price Fluctuation	1,000 yen per 1,000 kg, if the standard price is under 20,000 yen 1,200 yen per 1,000 kg, if the standard price is from 20,000 yen to, but not including 40,000 yen. 1,400 yen per 1,000 kg, if the standard price is from 40,000 yen and up No price limits in the current month from the 15th of the delivery month	Same as conventional
Position Limits	Current delivery month 100 lots, 1st contract month following the current delivery month 200; 2nd contract month 500 lots and 1,500 lots from the 3rd contract month onwards	Current delivery month 300 lots, 1st contract month following the current delivery month 600; 2nd contract month 1,500 lots and 3,000 lots from the 3rd contract month onwards
Last Trading Day	2 business days prior to the delivery day	Same as conventional
Delivery Day	1 business day prior to the last business day of the delivery month. December 24 for December contract; if not a business day, then the delivery day is moved up to the nearest business day.	Same as conventional
Contract Grade [11]	GMO or a mixture of GMO and non-GMO No. 2 yellow soybeans of Indiana, Ohio, and Michigan origin produced in the U.S.A. (Non screened, stored in silo.)	Identity preserved non-GMO No. 2 yellow soybeans of Indiana, Ohio and Michigan origin produced in the U.S.A. (Non-screened, stored in silo)
Deliverable Grade	GMO or a mixture of GMO and non-GMO No 2 yellow soybeans of Iowa, Illinois and Wisconsin origin produced in the U.S.A. (Non-screened, stored in silo). Effective from the April 2001 contract month and onward months.	Identity preserved non-GMO No.2 yellow soybeans of Iowa, Illinois and Wisconsin origin produced in the U.S.A. (Non-screened, stored in silo)
Method of Settlement [12]	Physical delivery by warehouse receipt	Physical delivery by designated warehouse receipt
Delivery Points [13]	Exchange designated warehouses in Tokyo, Kanagawa, Chiba, and Saitama	Exchange designated warehouses in Tokyo, Kanagawa, Chiba, and Saitama.
Initial Customer Margin	70,000 yen	25,000 yen

[11] At TGE Contract Grade also is referred to as Standard Grade for Non-GMO Soybean Futures
[12] TGE also refers to Method of Settlement as Delivery System for Non-GMO Soybeans Contracts
[13] TGE also refers to Delivery Points as Delivery Locations for Non-GMO Soybeans Contracts

Table 3. Suggested necessary conditions for a successful futures contract

Characteristic	Is attribute present for TGE non-GMO soybean contract?	Comment of characteristic for TGE non-GMO soybean contract
Economic need	yes	Relatively high volume, U.S. production is developing for these markets, and consumer demand is apparent.
Well written contract	marginal/yes	Contract specifications lack tolerance level for contamination, but use of warehouse delivery alleviates some concern over distribution of value, risks, and decision rights between trading partners.
Well defined and thick underlying cash market	?/yes	Inter-temporal arbitrage appears to keep inter-temporal returns at or below cost of carry in the market.
Competitive marketplace	yes/maybe	Antidotal evidence suggesting a competitive market. Arbitrage is occurring and relationship between non-GMO and conventional contracts appear to conform to theory.
Cross-hedge liquidity	yes	Volume and open interest, and ratio of volume to open interest, follow patterns and levels observed in mature futures contracts.
Price volatility and ability to attract speculators	yes	Price volatility is similar to that for mature commodity futures contracts.
Residual basis risk	?	Spread between non-GMO and conventional soybean contract exhibits considerable risk. Thus, non-GMO soybean hedgers could not effectively cross-hedge using the conventional soybean contract.