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An Initial Look at the Tokyo Grain Exchange Non-GMO Soybean Contract

Joe L. Parcell

Genetically modified organisms (GMOs) such as soybeans and corn have garnered considerable consumer attention due to the concern over potential effects from using these commodities as inputs into food production. In the simplest form, segregation of bioengineered and non-bioengineered crops is an identity-preserved system. For these identity-preserved systems to exist, there must be a market discovery mechanism in place whereby supply and demand factors interact to establish a market price. In May 2000, the Tokyo Grain Exchange began a non-genetically modified organism (non-GMO) soybean contract. This article describes information garnered from the first public-offered identity-preserved marketplace.

Key Words: biotechnology, genetically modified organisms, identity-preserved markets, non-GMO, soybean contract, Tokyo Grain Exchange

Considerable attention has been given to the economics of nontransgenic [or non-genetically modified organism (non-GMO)] commodities (see Heiman, Just, and Zilberman, 2000; Miranowski et al., 2000; Sparling, Turvey, and Mark, 1999). Yet, the issue of market segregation costs and returns for non-GMO commodities has only recently garnered the attention of economists (Maltsbarger and Kalaitzandonakes, 2000). To further motivate the issue of market segregation during the 1999 crop year, grain-merchandising firms (such as Bungee, ADM, and AE Staley) requested that producers segregate transgenic and nontransgenic crops. This request was made because of a perceived differentiated demand which might cause non-transgenic crops to receive a market premium relative to transgenic crops. Soon thereafter, however (and formally in Spring 2000), these firms backed away from earlier statements and cited a lack of market premium relative to segregation cost as the primary reason—i.e., lack of demand for these differentiated products. Although the above measures suggest that, on a large scale, the segregating costs exceed premiums, markets have arisen for non-GMO crops. In particular, the Tokyo Grain Exchange (TGE) began offering a non-GMO soybean contract in May 2000.

Why would such a market develop? In 1999/2000, Japan imported 4.75 million metric tons of soybeans. Most of these soybean imports originated in the United States. Soybeans are primarily used as inputs for Japanese food products. Thus, as

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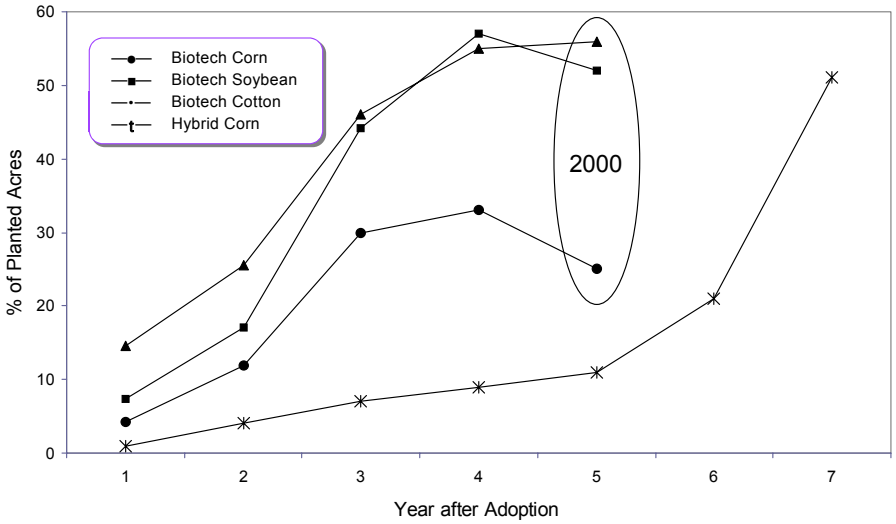

Sources: Kalaitzandonakes, 1999; USDA/National Agricultural Statistics Service, 2000

Figure 1. Rate of adoption of transgenic and hybrid corn in the United States after initial use of technology

the percentage of acreage planted to transgenic crops in the United States increased (refer to Figure 1) and consumer concerns over use of transgenic crops heightened, consumers and processors in Japan began sourcing nontransgenic 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 the development of a futures market contract.

The TGE non-GMO soybean futures contract is the first such public-traded commodity for a non-bioengineered crop. Furthermore, this contract can be 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 primary objective of this article is to provide an initial examination of the Tokyo Grain Exchange non-GMO soybean contract. In the sections that follow, the contract is introduced and then compared to a conventional soybean contract traded at the TGE. Similarly, a description of the market premium is presented and then compared to the cost of segregating non-GMO soybeans.

The TGE Trading System

The following information is available online at the Tokyo Grain Exchange web site. 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 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 number 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.

Contract Specification

Table 1 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 the size of the conventional contract (10,000 kg versus 30,000 kg). Second, the position limits for the non-GMO contract are three times larger than under 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 is likely 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.

Trading Volume

Figure 2 graphically depicts the conventional and non-GMO April 2001 contract volume. The ratio of non-GMO to conventional contract volume has averaged over 3 for the April contract. As noted above, the size of the non-GMO soybean contract is one-third the quantity of the conventional contract. Thus, the non-GMO contract bushel volume (at three times greater contract volume) is equivalent to a conventional soybean contract bushel volume. Relative to the December 2000 contract (not shown), volume in the April non-GMO and April conventional contract has been nearly five times larger. The December 2000 non-GMO-to-conventional contract volume ratio has averaged around 1.

Table 1. Tokyo Grain Exchange Contract Specifications

Description	Conventional Soybean Contract	Non-GMO Soybean Contract
Launched	March 1984	May 2000
Contract Size	30,000 kg/1,180 bushels	10,000 kg/392 bushels
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
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 onward	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 onward
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 24th 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 [a]	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 Iowa, Illinois, and Wisconsin 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 [b]	Physical delivery by designated warehouse receipt	Same as conventional
Delivery Points [c]	Exchange-designated warehouses in Tokyo, Kanagawa, Chiba, and Saitama	Same as conventional
Initial Customer Margin	70,000 kg	25,000 kg

[a] TGE also refers to "contract grade" as "standard grade" for non-GMO soybean contracts.
[b] TGE also refers to "method of settlement" as "delivery system" for non-GMO soybean contracts.
[c] TGE also refers to "delivery points" as "delivery locations" for non-GMO soybean contracts.

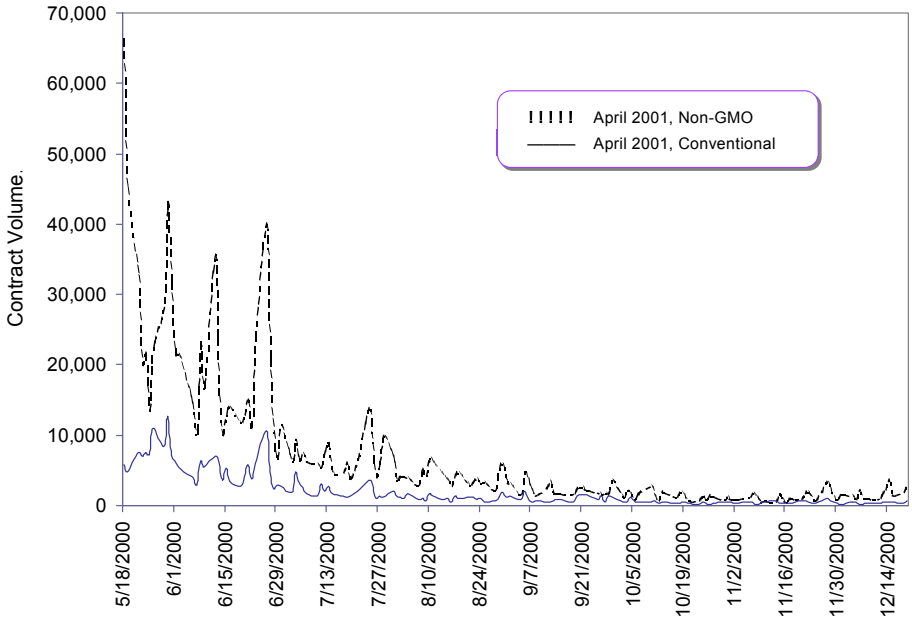

Figure 2. TGE conventional and non-GMO soybean April contract trading volume (5/18/00 to 12/19/00)

Non-GMO Soybean Premium

To compute the premium, the difference between the conventional and non-GMO contract was calculated (Tokyo Grain Exchange, 2000), converted to U.S. dollars using the exchange rate on that date (St. Louis Federal Reserve, 2000), and then converted to a per bushel value. Figure 3 illustrates the price difference (i.e., premium) between the non-GMO and conventional soybean contracts for the May 18 to December 19, 2000 period. The December 2000 and April and August 2001 contracts are represented. Early on, the premium ranged between $0.25 and $0.40 per bushel. By the end of July, premiums began to fluctuate independent of the contract month. Some of this variability may be due to relatively low volume (thin market) for some of the conventional and non-GMO contracts (e.g., the December non-GMO contract has had as few as 15 contracts traded). As the December 2000 contract approached expiration, the premium exceeded $1/bushel, while the price for the other contracts ranged from $0.20/bushel to $0.60/bushel. Unfortunately, there are insufficient data at this time to empirically examine the cause of the premium variability between contract months or over time.

The premium shown in figure 3 represents the value paid for a bushel of non-GMO soybean of U.S. origin at delivery locations in Japan. Because in a competitive market, such as the Japan non-GMO market, marginal revenue equals marginal cost, the premium should represent the additional marketing and production costs of

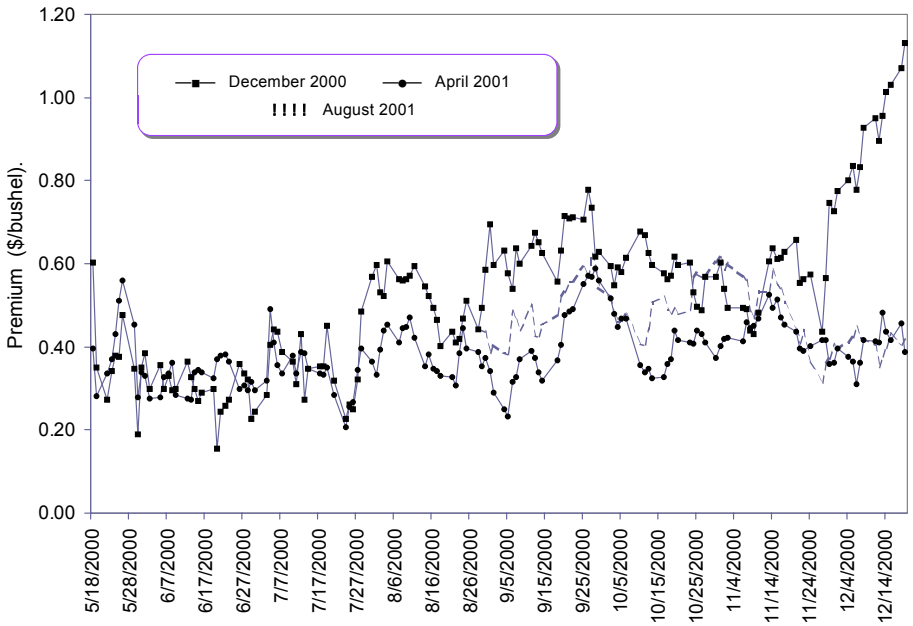

Figure 3. Computed price difference (premium) between U.S.-origin non-GMO and conventional soybean price quoted at the Tokyo Grain Exchange for the December 2000 and April and August 2001 contracts (5/18/00 to 12/19/00)

segregating non-GMO soybeans. A recent study by Lin, Chambers, and Harwood (2000) estimated the segregation costs of non-biotech soybean between the county elevator and export elevator to be as high as $0.54/bushel and, even under less stringent assumptions, the segregation cost could be $0.18/bushel. Maltsbarger and Kalaitzandonakes (2000) calculated segregation costs to range from $0.16 to $0.27 per bushel at the local elevator level. Clearly, these segregation costs are close to or above the premium offered at the TGE, and segregation costs involved in shipping from the export elevator to Japan have not been included. The exception is the premium observed in the final trading weeks of the December 2000 contract. The increase in premium may better reflect the market price long positions some holders are willing to pay for accepting delivery from short-position holders.

The premium for non-GMO crops should cover the marginal cost of producing and segregating non-GMO crops. Yet, anecdotal evidence from TGE non-GMO soybean contracts, combined with estimated segregation and opportunity costs, suggests otherwise. Unfortunately, information is just now becoming available on the segregation and opportunity costs at the farm level. An entire issue of *AgBioForum* (Spring 1999) was dedicated to discussion surrounding the opportunity costs (i.e., cost savings) to producers of using nontransgenic seed. However, further analyses will be required to effectively derive the segregation and opportunity costs.

Discussion

What about producer premiums for non-GMO soybeans? The producer must account for segregation and opportunity costs of producing an identity-preserved commodity. Based on the Tokyo Grain Exchange non-GMO soybean market premium, in combination with initial analyses of segregation and opportunity costs, there appears to be little opportunity for producers to incur significant increased revenues (after everyone takes a piece of the pie) from producing non-GMO soybeans. This finding suggests that producers and agribusinesses are underestimating segregation and opportunity costs of producing non-GMO soybeans on a commodity level (i.e., supply exceeds demand). Similarly, it may be that existing contracts for food-grade soybean production in the United States destined for the Japanese market are filling this niche market. Alternatively, there may be a level of uncertainty surrounding value of non-GMO soybeans in food production—i.e., firms are unsure of consumer demand for non-GMO products.

Because it is impossible to differentiate hedgers from speculators, the actual demand for non-GMO soybeans is difficult to estimate at the TGE. Some Japanese buyers of non-GMO soybeans of U.S. origin have expressed concern over quality of soybeans that may be delivered on this contract (Nill, 2000). The contract specifications do not list particular levels of quality characteristics (e.g., oil content), and most of the non-GMO soybeans used in Japan are for food products.

Thus, establishing quality specifications with an identity-preserved market, such as the TGE non-GMO soybean contract, is important. Further information is needed to understand the segregation costs of identity-preserved grains, because as additional identity-preserved price discovery mechanisms develop, more questions are likely to arise. As suggested by some of my peers and as evident from the discussion above, the debate over biotechnology will enhance the need for economists to more critically evaluate the costs and benefits of an identity-preserved food marketing system.

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