



# Agricultural Futures & Options



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**The New York Board of Trade (NYBOT)** provides the world's premier futures and options markets for several internationally traded commodities.

cocoa

coffee

cotton

frozen concentrated orange juice (FCOJ)

sugar

**NYBOT** is also a pioneer in the development of futures and options for the dairy industry.

As the parent company of two of the city's oldest commodity exchanges – the **Coffee, Sugar & Cocoa Exchange (CSCE)** and the **New York Cotton Exchange (NYCE)** – NYBOT builds upon a proud tradition of equitable and open price negotiation for key agricultural commodities.

**The New York Board of Trade** – responding to the challenge of change with the strength of tradition and the capacity for innovation.

*The New York Board of Trade (NYBOT) is the parent company of the Coffee, Sugar & Cocoa Exchange, Inc. (CSCE) and the New York Cotton Exchange (NYCE®). Through its two exchanges and their subsidiaries and divisions, which include Citrus Associates, FINEX® and the New York Futures Exchange (NYFE®), NYBOT offers a variety of agricultural, financial and index products. The Cantor Exchange (CX), a joint venture with eSpeed, Inc. (Cantor Fitzgerald), provides the first full-time, electronic market for U.S. Treasury futures.*

*This brochure serves only as a brief overview of the agricultural commodity futures and options contracts offered by the NYBOT exchanges. Trading in each of the NYBOT markets is governed by specific rules and regulations set forth by the exchanges. These rules are subject to change. For more detailed information and specifications on the agricultural contracts or any of the index and financial products traded on the exchange subsidiaries and divisions of the New York Board of Trade, contact NYBOT or your broker.*

# Introduction

The trading of agricultural commodities represents one of civilization's oldest commercial activities. Crop commodities, such as cotton and sugar, have been in use for around 3,000 years. Basic commodities with universal value in different cultures could be described as the first international currencies of exchange. With such a long history as a basis of commerce, it is easy to understand how the marketplace value of each commodity could play a major role in the rise and fall of empires.

The shape and scope of commodity trading has evolved since the early trading routes were established, but the role of commodity trading still remains a fundamental economic component in world economic development. The price fluctuations of a basic commodity can still shock the economy of a country or an entire region. The price of the latest yield of the citrus grove or the coffee plantation matters a great deal. The central importance of commodity pricing gave rise to the commodity exchanges and their principal pricing tools – futures and options contracts.

For well over a century, cotton, coffee, sugar, cocoa and citrus industry representatives have joined traders and investors in the New York Board of Trade (NYBOT) futures and options markets to engage in price discovery, price risk transfer and price dissemination for these internationally traded commodities. Each day, people from around the world look to the NYBOT markets for a benchmark price.

## NYBOT Agricultural Market History

While the pricing role of the NYBOT markets has remained the same, the exchanges have changed their names, merging, expanding and adding new agricultural products over the years.

- 1870** *The New York Cotton Exchange (NYCE) trades first cotton contracts*
- 1882** *Coffee Exchange of the City of New York trades first coffee contracts*
- 1914** *Coffee Exchange adds sugar futures*
- 1916** *Coffee Exchange becomes the New York Coffee and Sugar Exchange*
- 1925** *New York Cocoa Exchange begins trading cocoa futures*
- 1966** *New York Cotton Exchange adds Frozen Concentrated Orange Juice (FCOJ-1) futures*
- 1979** *New York Coffee and Sugar merges with New York Cocoa Exchange forming the Coffee, Sugar & Cocoa Exchange, Inc. (CSCE)*
- 1982** *CSCE introduces options on sugar futures, first U.S. exchange-traded option*
- 1984** *NYCE introduces cotton options*
- 1985** *NYCE adds FCOJ-1 options*
- 1986** *CSCE adds cocoa and coffee options*
- 1993** *CSCE launches dairy futures and options*
- 1998** *CSCE and NYCE form New York Board of Trade*
- 1999** *NYCE adds FCOJ-2 and FCOJ-Differential futures*

## The Physical (Cash) Market

The unpredictable factors associated with the supply and demand for agricultural commodities can have an immediate impact in the physical market on one area – the price. A hurricane, flood or freeze can have a catastrophic effect on the price and even availability of cotton for a mill or orange juice for a retailer. The sudden loss of a supply source from civil strife in a producer country could be disastrous for a specialty coffee roaster. An unexpected bumper crop combined with declining demand can have severe short and long-term consequences for the cocoa producer. A government policy change can create a surplus of sugar for a refiner. Unforeseen price volatility can harm the individual bottom line or even threaten the economic stability of a whole industry.

**The great price swings** that characterize commodity cash markets have also led to numerous attempts to influence the cash market through everything from artificial control of supply and demand to government price supports. All of these approaches have failed to provide a satisfactory long-term solution to commodity cash price volatility.

Following the significant decline of commodity prices at the close of the twentieth century, the World Bank recognized that the solution to uncontrolled price swings was not to be found in artificial manipulation of the physical market. The free market offered more effective means to address commodity pricing. The pricing mechanism that again and again has proven itself of greatest value to the physical commodities market is the traditional exchange futures market.

## Agricultural Commodity Futures and Options Market

Each of the NYBOT commodities markets serves a global chain that touches a wide range of commercial entities from small farmers to international conglomerates. They all face the same problem – how to reduce the risk associated with volatile cash market prices. The NYBOT futures and options markets grew out of the need to bring some order to the price discovery process and provide a mechanism for effective price risk management. The growth of international trade and the increasing complexity of market risk connected with each commodity have only reinforced the fundamental risk management value of the agricultural futures and options contracts offered through NYBOT.

**The modern exchange provides** the physical setting for trading, establishes the rules, monitors for and enforces compliance and oversees market activity. By providing a central location where the forces of supply and demand can come together in a fair and open forum, the exchange can fulfill its pricing functions – **price discovery** (the negotiation of the current best price); **price risk transfer** (the shift of cash market price risk exposure to other hedgers with opposite risk profiles or to futures market participants who are willing to assume risk in return for a profit opportunity); and **price information** (the regular and timely dissemination of pricing information to all interested parties around the world). At any time, an orange juice trader, for example, should be able to look to the NYBOT FCOJ markets for a product benchmark price that accurately reflects the FCOJ cash market realities and practices.

The current price of the “**nearby**” futures contract (the contract with the closest expiration date) represents a benchmark for the cash market price. The difference between the specific futures contract price and the cash price for the commodity at the local delivery point is called the “**basis.**” Normally, the futures price should be equal to the present cash price plus the amount of storage, insurance, etc. (carrying charges) necessary to carry the commodity to the delivery month of the contract. In addition, basis pricing also reflects the location (port of delivery) and the quality of the commodity. For example, a particular growth of coffee from a specific country might trade at a negotiated premium or discount to the futures price.

The commodity pricing system works so well because, although the futures and cash prices have a basis difference, they tend to parallel each other over time. As the contract delivery date approaches, the nearby futures price and the cash price usually move closer together (**convergence**). While futures and cash prices do have a strong parallel relationship, the basis figure is not constant. The basis tends to widen or narrow depending on such key factors as supply and demand at the local delivery point.

The standardization of the two basic types of contracts (**futures and options on futures**) ensures that the marketplace focuses on the price of the contract. This underlines a key distinction between the cash and the futures market – cash market participants negotiate primarily the buying and selling of the actual commodity; futures market participants focus on the buying and selling of a contract on a commodity.

**The futures contract** is a standardized legal commitment to deliver (or receive) a specific quantity of a commodity (or its cash equivalent) on a specified date at a specified delivery point. With the contract standardized in terms of delivery months and locations, quantity and grade of the commodity, the only element left to negotiate in the exchange market is the price. Since price, and not the commodity, is the focus of the futures and options market, delivery of the actual commodity is a function suited to the cash market.

The design of the futures market aims to serve buyers and sellers equally. Market participants, therefore, may enter the market on either the buy or the sell side. New buyers of futures contracts establish a “**long**” position in the futures market. New sellers of futures establish a “**short**” position. Most positions are closed out by the completion of an equal transaction on the opposite side of the original position: long positions are closed out by selling and short positions by buying. Physical delivery or cash settlement can also satisfy the obligation if the position is carried to contract expiration.

**A major feature of trading futures** contracts in the NYBOT markets and at other futures exchanges is the leverage provided by the system of **margin**ing. As a futures contract is not intended for use as a merchandising contract for transfer of commodity ownership from seller to buyer, there is no need for the full contract value to change hands. The margining system recognizes that both buyer and seller are exposed to the risk of adverse price movement. The maintenance of futures market financial integrity requires that all participants (buyers and sellers) post an **initial (or original) margin** deposit. This payment (usually a small percentage of the contract’s full value) represents a good

faith deposit to ensure that market participants will meet their contractual obligations. Because the exchanges' clearinghouse guarantees contract performance to its members, the exchanges and the clearinghouse establish minimum margin levels for each market and periodically adjust them to reflect market activity, especially price volatility. In addition, at the close of each trading day, each trader's account equity is adjusted to reflect price movements. If the market has moved against the trader's position, **variation margin** payments are required to restore the trader's equity to the minimum level set by the exchanges and the clearinghouse.

Commodities exchanges serve essentially two types of traders – the **hedger** who seeks to transfer their cash market price risk to the other futures market participants and the **investor/speculator** who is willing to assume that risk in exchange for the opportunity to profit from price movement in the futures market.

The hedger enters the futures market to transfer/reduce risk associated with cash market transactions. The hedger may be protecting a buy or sell price. **Hedging** involves establishing a position in the futures market equal to and opposite a position in the cash market. A gain in the futures market will offset a loss in the cash market, or vice versa. A grower, for example, who harvests coffee, has coffee to sell. Therefore the grower is said to be “long” physical/cash coffee. To hedge the crop, the grower would establish the opposite or “short” position in the futures market by selling futures contracts. The grower therefore protects the selling price of the coffee.

Investors, on the other hand, are willing to assume the price risk by taking a position on either side of the market in order to

pursue a profit from changing prices. Futures investors seek only to buy low and sell high. The chronology is unimportant. Investors contribute important liquidity to the market, increase price discovery efficiency and facilitate the hedging process. Price volatility in a commodity is inherent to the cash market, not the result of speculation in the futures market. Without volatility, there is no reason for a futures market, because price risk is minimal.

Different markets utilize different hedging strategies, which may change throughout the year depending on cash market situations and business goals. The basic elements of hedging are constant. The establishment of a futures hedge locks in a price. Hedging with options establishes a price floor or ceiling while retaining upside potential in a favorable cash market.

Since 1982, options on futures contracts have also been available in the NYBOT markets. An option contract has the same kind of standardization as a futures contract. An option on a futures contract is basically an agreement between two parties (a **buyer/holder** and a **seller/writer**) that grants the option buyer/holder the right, but not the obligation, to buy (a **call option**) or sell (a **put option**) a futures contract at a predetermined price (“**strike price**”) within a specified period of time (the option “**expiration date**”).

In exchange for acquiring the rights granted by the option, the option buyer makes a one-time payment (**premium**) to the seller/writer of the option. The writer of the option receives this premium for assuming the obligation to take a position in the futures market should the holder exercise, before the option's expiration, the right to buy or sell a futures contract under the terms of the option agreement. The buyer/

## The NYBOT Agricultural Futures and Options Markets

holder of an option does not have to post margin until and unless the holder opens a futures position by exercising the option and the right to buy or sell a futures contract. The option seller/writer, however, maintains a margin account because of the assumed obligation to open a futures position if the option is exercised.

Other key features of exchange trading include the regulatory mechanisms that protect the market participants and the exchange clearinghouse that provides financial safeguards for trading. The designated clearinghouse for the New York Board of Trade markets – the **New York Clearing Corporation (NYCC)** – becomes the counterparty and guarantor for every trade executed at the exchanges. The NYCC assures contract performance through stringent financial requirements and NYCC member position limits.

**C**ocoa, like a number of “exotic” beverages and spices, was originally served as a luxury drink to the Aztec court and later to Spanish royalty. Gradually, the consumption of cocoa as a beverage spread throughout several major European cities, as it became more popular and less expensive.

The great transformation of cocoa from a beverage to a solid form began in 1828 when liquid cocoa butter (called liquor) could be pressed out of ground cocoa beans and then used as a base with sugar to make chocolate candy. The shift from beverage to solid candy added a whole new manufacturing component to the marketing chain and made the product of the cocoa bean more easily transportable and consumable. The invention of milk chocolate 40 years later further increased the attraction for chocolate and the demand for cocoa beans. Once cocoa became available to general society, its significance in the world marketplace was ensured.

In 1925, the world’s first cocoa bean futures market was founded: the New York Cocoa Exchange. Options on cocoa futures began trading in 1986.

The cocoa tree is strictly a tropical plant, thriving only in hot, rainy climates with cultivation generally confined to areas not more than 20 degrees north or south of the equator. The cocoa tree takes four or five years after planting to yield cocoa beans and from eight to ten years to achieve maximum production. The fruit (bean) of the cocoa tree appears as pods. When ripe, these pods are cut down and opened; the beans are removed, fermented and dried. Weather conditions, disease, insects and crop care can have a major effect on annual cocoa yield. Black pod disease has become a major concern for African growers. Cocoa growth factors, therefore, are somewhat more restrictive than cotton or sugar.

**On the demand side**, the developed countries with the highest incomes are the major consumers of cocoa-based products. The amount of cocoa ground for use (known as the quarterly cocoa “grind”) is traditionally used to measure consumption trends. Higher grind figures indicate rising demand. Since cocoa products are still perceived as luxury items in a number of developing countries, periods of economic decline affect cocoa consumption. Substitutes for cocoa butter in the manufacturing process, use of cocoa butter in non-food items such as cosmetics and changing popular tastes are also factors in the supply/demand cycle.

Consolidation at several levels of the cocoa industry, changing inventory practices, and the progress of privatization in key West African producing countries have compounded traditional uncertainties associated with cocoa pricing. The NYBOT cocoa markets provide an evolving industry with strong risk management capabilities.

### Trading Cocoa Futures and Options

The multiplicity of factors that limit the responsiveness of the cocoa cash market to supply/demand shifts highlights the importance of hedging through the NYBOT cocoa markets. Changes in cash market conditions and practices often affect hedging strategies in the futures market. The **open interest** figure is often a good indicator of the level of cocoa hedging activity. Open interest represents the total number of open futures contracts that have not yet been offset by opposite futures transactions or fulfilled by delivery.

**The cocoa futures contract** listed for trading calls for delivery of 10 metric tons of cocoa beans (22,046 lbs.). Each lot of cocoa is sampled and then graded by Exchange-

licensed graders and price adjustments may be made for imperfections according to established standards. The contract permits delivery of beans from any country or clime including new or yet unknown growths as long as it meets the standards concerning defects, bean count, bean size and other basic factors. Over 40 growths divided into three classifications are specified in the contract with two groups trading at a premium to the futures price and one group trading at par. The Exchange also designates delivery points and licenses specific warehouses.

Traditionally, candy manufacturers, cocoa importers, exporters, trade houses and producers are primary users of cocoa futures and options.

**C**offee first appeared, according to historians, in the Ethiopian province of Kaffa around 3 A.D. where foods were seasoned with ground beans. In about 1300 A.D., the southern Arabians first roasted and brewed coffee for use as a beverage. The Middle Eastern hub of the valuable trade routes to Asia, and later to Africa, once again became the source of a new staple of commerce for Europe – the coffee bean.

The coffee trade with, its vulnerability to long sea-route supply lines and weather variables, suffered from wild price swings. After uncontrolled cash market speculation brought about a calamitous market collapse in 1880, a group of coffee merchants mobilized to bring some order to the chaos. As a result of this effort, on March 7, 1882, 112 dealers and importers gathered in lower Manhattan to buy and sell coffee futures. The first transaction on the New York Coffee Exchange of 250 bags of coffee helped to establish an organized marketplace that served several key functions: set standards for different grades of coffee;

provided a market where growers, merchants, roasters and wholesalers could hedge against losses in the cash market; established an arbitration system to settle disputes; recorded and disseminated current market information to members.

Although coffee, like cotton, has many grades, growths and specific growth qualities, it is primarily classified into two types – arabica and robusta. Arabica coffee beans, which grow mainly in the tropical highlands of the Western Hemisphere, make up the bulk of world production. Robusta coffee beans, less mild than arabica, are produced largely in the low, hot areas of Africa and Asia.

**Coffee prices move quickly** and often in response to key supply and demand factors such as weather, political policies, labor contracts, crop predictions, etc. The physical market does not move as quickly to balance the supply/demand equation by adjusting the physical production or availability of the commodity. Futures markets, however, can respond quickly through their price discovery process that reflects changing supply/demand conditions. They provide the perfect tools for risk managers throughout the coffee marketing chain to help protect the bottom line.

### Trading Coffee Futures and Options

Coffee offers a good illustration of the vital risk management function of futures and options. Coffee production's sensitivity to weather shocks and its limitations of climate and geography are a constant source of price volatility. The historical volatility for coffee has been significantly greater than for other commodities (like cocoa, sugar or cotton).

Coffee futures and options markets do not increase volatility. The volatility and risk originate in the cash market. Coffee futures and options markets cannot remove volatility and risk; they do allow coffee industry participants to transfer and manage risk.

**The NYBOT coffee market** trades the Coffee "C" contract. Each futures contract is for 37,500 lbs. (approximately 250 bags) of Exchange-certified arabica coffee produced in several Central and South American, Asian and African countries.

Coffee (like cocoa) from the deliverable growths listed in the contract specifications must be sampled, graded, weighed and certified in accordance with the certification rules of the Exchange. If the Exchange coffee graders have determined that the coffee meets the minimum standards, the Exchange then issues a certificate that the coffee is deliverable under the contract. The grading process is a crucial component in maintaining contract specification standardization and consistency, ensuring that the trading process focuses entirely on price. The Exchange licenses warehouses in designated ports that meet conditions specified in the Exchange rules.

Coffee producers, importers, exporters, trade houses and roasters hedge with Coffee "C" futures and options. Because price volatility affects each part of the marketing chain differently, all participants have an equal say in pricing. Coffee options and futures serve different hedging strategies, but they both share the same goal – to protect the manager's bottom line that would be fully exposed to adverse price moves when unhedged.

**C**otton has been in the global marketplace for at least 3,500 years. Archeological research has uncovered cotton fibers on different sides of the globe in India and Peru. The Persians, the Romans and the British were among the great empires that valued, traded and spread this universal commodity. The Industrial Revolution further magnified cotton's economic status. The spinning jenny, spinning machine and steam engine transformed cotton, and cotton, in turn, changed world trade. When the machine age reached the farm with the invention of a machine to separate cotton fiber from the seed – the cotton gin – the economic power of cotton underwent another period of enormous expansion. And in the midst of the mechanization and movement of production, the boll weevil served as a reminder of the vulnerability of any crop commodity to natural disaster.

Cotton throughout history stands as a primary example of the power and influence of a single commodity on the political, economic and social lives of all the citizens of the world. The importance of this single crop can be felt in its complex history of rural land and urban industrial development.

The sudden and sometimes catastrophic change in the price of cotton finally led 106 cotton merchants and brokers in 1870 to organize the New York Cotton Exchange (NYCE) the oldest commodity exchange in New York. The Exchange quickly grew into a highly visible, liquid futures marketplace. The addition of options on cotton futures in 1984 affirmed this forum's central role.

The cotton industry has experienced enormous farming, manufacturing and marketing changes in its 3,500-year history. While

many crop commodities, such as coffee, are more land and climate specific, cotton can grow nearly anywhere that has the requisite 200 frost-free days and the basic water supply. The cash market is ever shifting as conditions favor different growths in different countries and technology continues to improve the manufacture, marketing and even genetic structure of cotton. Government involvement in pricing and production as well as international and regional trade agreements also contribute to market changes.

### Trading Cotton Futures and Options

In spite of all of the changes in the cash market, the cotton futures market today still provides the same primary functions – price discovery, risk transfer and price dissemination. The world prices its cotton at a premium or discount to the Cotton No. 2 futures contract traded in New York. The stability and continuity of the futures market function is based on the standardization of the contracts to reflect cash market conditions and practices. The specifics of the cotton contract have been adjusted over the years to accommodate changes in the market and the crop itself.

**The unique characteristics of cotton** as a plant are reflected in the complexity of grading standards of the cotton futures contract. While the contract has an established size of about 100 bales (with each bale about 500 lbs. of cotton), each bale has its own class and grade. The USDA does all the classing for cotton for futures delivery. Cotton grading from coarse to premium is a critical economic issue for the end user. Coarser cotton can be used for such things as denim where premium cotton is necessary to make soft sheets and shirts.

The primary cotton classing components are color, length, micronaire and strength. Micronaire is a reading of the coarseness of the fiber measured by its resistance to air passage. Strength is quoted in “Gram per Tex.” Regarding color, the contract permits delivery of only “white” grades of “good middling to low middling” and light spotted grades of “good middling to middling.” The basic fiber length is 1 1/16 inch with a minimum of 1 1/32 inch at commercial discount and a maximum of 1 3/32 at a premium. Any longer staple does not carry a higher premium.

The cotton industry uses the Cotton No. 2 futures contract as its primary tool to hedge the purchase or sale price of cotton. Hedging is possible because the cotton futures and the cash market have a strong relationship and generally move in tandem over time.

**To establish a successful hedge**, the industry user in cotton (as in other agricultural commodities) must calculate a historical basis for the product trading in the local cash market. The basis figure represents the difference between the hedger’s local cotton cash price and the applicable Cotton No. 2 futures contract price. That difference may widen or narrow over time. This **basis risk** cannot be transferred to the futures market.

The successful cotton hedger can utilize a variable mix of futures, options on futures and forward contracts. The cotton futures and options markets provide a number of possible hedging and investment strategies and opportunities.

*(A cotton futures trading example can be found in the last section of this brochure.)*

**S**ugar cane originated some 2,500 years ago on the Indian sub-continent. For centuries, sugar has been a highly valued and widely traded commodity. Because of its primary use in foods prepared in many cultures, its trade value was based upon its universal use, not only as a flavor enhancer but also as a food preservative. Sugar’s market significance was further increased because of its fermenting properties and its byproducts (e.g., molasses) which had equal or greater economic value than the granular sugar and less perishability when shipped long distances.

As the sugar market grew more global in nature during the twentieth century, it became more vulnerable to supply and demand shifts in various parts of the world. Before the development of the sugar beet industry, the semi-tropical location of the original sugar cane source meant that supply routes were long, tenuous and easily disrupted. The closing of the European markets for sugar during World War I represented such a supply disruption.

That event led to the trading of sugar futures in the United States in 1914 at the Coffee Exchange of the City of New York. Once again, a period of great economic uncertainty and wildly fluctuating prices contributed to the creation of a reliable, open marketplace for the pricing of a world commodity.

The power of the worldwide sugar industry may seem disproportionate to its market price of perhaps 5-10 cents/lb. Sugar continues to strengthen its position in the world marketplace, however, by expanding its presence in a broad range of economic areas from foods to fuels.

The sugar cash market can be described as a “residual” market – a market in which freely traded sugar is only a fraction of worldwide production. Since the free market may be less than half of world production, a small change in production or consumption can translate into a much larger change in the free market supply. Even in an era of world trade agreements and declining government subsidies, sugar remains a market heavily managed and manipulated by government programs. Just as one country’s loosening of sugar import quotas can fuel demand for free market sugar, another nation’s high price support levels can encourage domestic over-supply and create a free-market surplus. Sugar has regularly been one of the world’s ten largest agricultural futures and options markets in terms of its total trading volume. The **total volume** figure is a record of the total number of contracts traded.

Two main crops produce most of the world’s sugar: sugar cane and sugar beets. Both produce the identical refined sugar product. Sugar cane, which accounts for about 70% of world production, is a bamboo-like grass grown in semi-tropical regions. Sugar beets grow in temperate climates and account for the balance of world production. Extreme weather conditions, disease, insects, soil quality and cultivation affect both cane and beet production, as do trade agreements, refinery activity and price support programs. India and Brazil are major cane producers. The European Union and Ukraine produce large quantities of sugar beets.

### Trading Sugar Futures and Options

The global importance of the New York Board of Trade’s world sugar futures and options markets can be seen in the record volumes and significant product innova-

tions associated with NYBOT’s largest market. Sugar futures and options markets have traditionally provided hedging tools for producers, exporters, candy manufacturers, trade houses, bakers, refiners and dealers.

**The NYBOT sugar markets** offer two sugar futures contracts: world sugar #11 and domestic sugar #14.

The delivery terms of the current world Sugar #11 contract (launched in 1970) specify that the 112,000 lbs. of raw centrifugal cane sugar, stowed in bulk, must be FOB (Free on Board); that is the seller who delivers the sugar at the agreed price pays cost of loading sugar on board the vessel. It is the buyer’s responsibility to arrange for the transportation from that point and the insurance. In a futures contract, the seller chooses the point of delivery from the list of ports designated by the contract. Sugar suitable for delivery under the world sugar contract, like other agricultural commodities, must adhere to certain grades and standards of sucrose content. Polarization is a common measure of sucrose content.

The domestic Sugar #14 futures contract (introduced in 1985) requires delivery of 112,000 lbs. of raw centrifugal cane sugar in bulk with CIF duty paid at specified Atlantic and Gulf Ports. CIF (Cost, Insurance, Freight) refers to a sale in which the buyer pays a price that includes FOB value at port of origin plus costs of insurance and transportation.

In 1982, options on the world Sugar #11 futures contract became the first U.S. exchange-traded agricultural commodity option since 1936. Regular options are available for March, May, July and October plus a January option on March futures. **Serial options** (short-life options

providing additional option expirations on existing futures contracts) are offered for the remaining months of the year. Since 1998, the NYBOT sugar markets have also traded **flexible options** on world sugar. These specialized contracts allow market participants to customize certain contract terms including strike price, expiration date and exercise style.

Options added a crucial dimension to risk management and the increase in the volume of options traded each year demonstrates their popularity, flexibility and usefulness.

*(A sugar option-trading example can be found in the final section of this brochure.)*

Hedging with sugar futures and options allows firms and individuals to lock in or establish minimum/maximum prices for upcoming purchases of sales of sugar or sugar-based products. The complexity and global scale of today's sugar industry and the sensitivity of profit margins to sugar price fluctuation have increased the relevance, value and use of the NYBOT sugar markets.

**F**rozen Concentrated Orange Juice (FCOJ) is a relatively modern form of a basic agricultural commodity. For centuries, oranges were consumed as a fresh fruit, not storable for long periods of time or easily shipped long distances except in dried form. The citrus market changed radically when the process for making FCOJ was invented in Florida in 1947. Demonstrating a clear preference for FCOJ convenience and taste, consumers quickly substituted FCOJ for fresh oranges.

More recently, the FCOJ market has experienced tremendous growth internationally due to technological innovations in packaging and bulk transportation systems. The invention of the FCOJ process and the many other advances, however, did not remove the price risk associated with the citrus industry.

In 1966, to meet the pricing challenges of this new industry, the Citrus Associates subsidiary of the New York Board of Trade was formed and FCOJ futures began trading. The rapid globalization of the industry (e.g., the development of the Brazilian citrus industry) and the price volatility of the orange juice quickly made FCOJ futures the primary hedging tool for the FCOJ industry. In 1985, options on FCOJ futures were introduced.

Today, over 70% of the oranges harvested in the U.S. are processed for orange juice. With the technological and global trade developments that have directly affected orange production and processing, the industry continues to grow rapidly.

Most oranges for U.S. – produced FCOJ are grown in Florida. Most concentrate is blended from two types of Florida oranges – early and mid-season oranges harvested from October through March and later maturing Valencia oranges that are harvested from April through June. While most of the FCOJ produced in the U.S. is consumed domestically, Brazil exports most of its production. In fact, Brazil dominates world trade in FCOJ, accounting for as much as 80% of the world's exportation of FCOJ.

Although other regions of the U.S. and other Central and South American countries compete in the orange market, Florida and Brazil crops remain dominant forces.

Because of the inverse relationship between the growing seasons for the U.S. and Brazil, their combined production make the FCOJ market a year-round market, accounting for an enormous portion of the world's oranges utilized for processing. In fact, much of the Brazilian and Florida crops are grown primarily for processing. In other countries, oranges are still grown primarily for the fresh produce market and juice processing is a residual use of oranges.

Although a number of factors such as processing capacity, disease and the strength of the U.S. dollar can affect the supply of FCOJ, it remains a true "weather" market. Frost and freezes may affect Florida production, while dry weather and droughts may affect Brazilian production. This sensitivity to weather factors combined with a competitive global juice/beverage market makes the price of FCOJ extremely volatile.

FCOJ futures and options provide important management capabilities for an industry that is vulnerable to extreme price risk.

### Trading FCOJ Futures and Options

Since 1966, FCOJ futures have been the primary hedging vehicles for the citrus industry. The original FCOJ futures contract (FCOJ-1) calls for delivery of 15,000 pounds of orange solids (3% more or less) not limited to any specific country of origin.

In response to the rapid evolution and globalization of the citrus market and the increased importance of Florida/Brazil, NYBOT introduced two FCOJ futures contracts in 1999: FCOJ-2 and FCOJ Differential. FCOJ-2 calls for delivery of Florida/Brazil-only FCOJ. FCOJ-2 does not trade as an outright contract for most of its life; it trades for all, but a day and a half, in differential combination with FCOJ-1 as the FCOJ-Differential futures contract.

Trading the FCOJ-Differential contract means trading the price difference between the Florida/Brazil and the juice represented by FCOJ-1. The two new contracts, in conjunction with FCOJ-1, allow industry participants to hedge price risk associated with Florida/Brazil-only product.

Options are currently only available on FCOJ-1 futures. The NYBOT FCOJ futures and options markets fulfill a variety of strategic needs for hedgers and investors.

**D**airy products, historically, have exhibited two unique characteristics. First of all, unlike crop (plant and harvest) cyclical production, milk production occurs on a daily basis. Secondly, dairy was essentially a local market. Because of its daily production and perishability, the market remained within a day's journey. The making of cheese and other related milk by-products extended the life of milk to some degree, but it was not until the advent of modern refrigeration and pasteurization/homogenization that the dairy market could expand its reach.

The unique supply/demand characteristics of dairy products have led the U.S. Government to provide long-term price supports for the domestic dairy industry. As a result of government policy designed to protect the historically local nature of dairy production and implemented by the United States Department of Agriculture (USDA), price was not a major issue for most of the twentieth century. In the 1980s, the Government began to edge away from price supports.

In the early 1990s, the dairy industry approached the CSCE subsidiary of the New York Board of Trade about developing dairy risk management tools. The first NYBOT dairy futures market began trading

in 1993. While the necessary price volatility was present in the cash market, the daily production factor and the continued legacy (although diminished) of government support presented enormous challenges to the development of the futures markets. The introduction of the Basic Formula Price (BFP) Milk futures contract offered the industry a promising contract market. Its cash settled feature (cash settled at expiration to the USDA calculated BFP for milk) removed the delivery concern and simplified the hedging process.

The \$20 billion dairy industry exhibits the necessary volatility to support active futures and options markets. The regional pricing disparities based on the local delivery model, however, created a fundamental obstacle to the dissolution of all government support and a full transition to market driven pricing.

The complexity of the milk pricing can be seen in the evolution of the USDA pricing mechanism. The USDA's current Milk Index does represent a free market price. Similar to its immediate predecessor, the Basic Formula Price (BFP), the Milk Index represents the monthly calculation of a USDA milk price survey. The Milk Index, however, focuses on the component pricing of milk – namely what plants pay producers for Class III milk (milk used primarily for cheese making). The BFP (a replacement for the old M/W – Minnesota/Wisconsin price) surveyed Class B (manufacturing grade) milk sales primarily in Minnesota and Wisconsin.

Recognizing the need to ease the transition free market dairy pricing, the USDA has encouraged the use of milk futures and options for dairy risk management through the implementation of the Dairy Options Pilot Program (DOPP), a program that teaches and assists dairy farmers in the

use of Milk Index put options to establish a milk price floor. The DOPP is based upon a program created, initiated and developed by NYBOT's CSCE subsidiary. NYBOT's Milk Index futures and options markets provide the dairy industry with vital risk management tools.

### Trading Milk Index Futures and Options

The NYBOT Milk Index futures and options contracts are an updated version of the original BFP cash settled contract introduced in 1997. The Milk Index futures contract trades in two sizes. The regular Milk Index futures contract calls for a cash settlement of the value of 1,000 times the Milk Index (equivalent to 100,000 lbs. of milk). The large Milk Index futures contract calls for cash settlement of 2,000 times the Milk Index (equivalent to 200,000 lbs. of milk). Options are available on all twelve contract months for the regular and large futures contracts.

In order to implement a successful risk management strategy, the dairy industry participant has to develop a complete marketing plan. This plan must include actual cost of production (based on historical data). This allows a farmer to determine, for example, a target price that reflects the cost of production and a reasonable profit margin. The plan must also include the historical basis – the difference between the individual target price and the Milk Index price (the futures price). This annual marketing plan accounts for the seasonal changes in input costs, target price and basis to allow for adjustment in hedging strategies.

Detailed and accurate historical information is a significant factor in a successful hedging program that may use Milk Index futures, options and forward contracting in varying combinations.

## Trading Examples

A futures hedge allows an industry participant to lock in a price. This kind of precision can be an advantage when it comes to longer term business planning. No matter how adverse the cash market move, the hedger has protected a specific price. The following example utilizes a basic hedging situation in the oldest of NYBOT's markets.

### A Cotton Futures Trading Example

#### Scenario:

In early April, a cotton merchant contracts with a textile mill to deliver **1000 bales of cotton** (approximately 500,000 lbs.) in July at **\$.65 per pound**. The merchant does not have a sufficient inventory of cotton on hand, but it is available for purchase at **\$.62 per pound**. Although the price in April would translate into a **\$.03/lb. profit**, the merchant does not want to tie up capital and reduce his profit by buying and storing cotton until July. The carrying charges would reduce or eliminate his potential profit. The merchant, however, is concerned that the cash market may increase by July. He is unable to establish a cash market forward contract for cotton at \$.62/lb. July futures are trading at **\$.65/lb.** on April 3. Cash is trading at **\$.03/lb. discount** to futures. He wishes to protect his **\$.03/lb. profit margin**.

#### Strategy:

To protect his/her potential profit margin, the merchant establishes a futures market hedge to lock in a purchase price for the physical cotton needed to satisfy the delivery agreement. On April 3, the merchant buys (goes long) **10 July futures contracts at \$.65/lb.** (one contract = 50,000 lbs./approximately 100 bales) and effectively locks in a purchase price for the cotton required to meet the delivery commitment.

#### Result:

On July 2, the cash market purchase price has increased to **\$.70/lb.** (\$.08/lb. more than his targeted purchase price). The merchant therefore meets the commitment to the textile mill by buying 1000 bales of cotton at **\$.70/lb.** and delivering it for **\$.65/lb.** for a net cash market loss of **\$.05/lb.** With July futures now priced at **\$.72/lb.** (cash now trades at only **\$.02/lb. discount**), the merchant simultaneously closes out the futures position by **selling 10 July cotton futures at \$.72/lb.** (which he bought at **\$.65/lb.**) for a **\$.07/lb. gain**. Setting the **\$.07/lb. futures market gain** against the **\$.05/lb. cash market loss**, gives the merchant a net **\$.02/lb. profit** on the entire transaction. The merchant has therefore protected \$.02/lb. of his original target profit margin (**\$.03/lb.**) by hedging his/her purchase price back in April.

The important thing to remember in a hedging example is the equal and opposite rule. Because the merchant in the example had no inventory to cover a forward delivery commitment at a fixed price (was "short" cotton) in the cash market, the merchant needed an anticipatory hedge to cover his cash market commitment. Therefore the merchant established an opposite position in the futures market by buying cotton futures (going long) to protect the purchase price. Merchants and wholesalers that have inventory must protect against falling prices. Similarly, a producer is vulnerable to a falling cash market for a crop to be harvested. In a sell (short) futures hedge, the producer would sell the necessary number of cotton futures contracts to protect the price of the expected harvest of a crop.

## A Sugar Option Trading Example

An options hedge will not lock in the specific price, but it will establish a price floor or ceiling to limit the losses in an adverse cash market. It can offer greater flexibility in an uncertain market and allow the participant some upside potential with the futures market loss limited only to the size of the premium paid for the option. The option buyer does not have to maintain a margin account, but the premium must be paid in full at the time of the purchase.

### Scenario:

In August, a sugar refiner expects sugar prices to increase by late winter. The refiner must take delivery of 224,000 lbs. of raw sugar in February. The cash price will be benchmarked to the March Sugar #11 futures price. March futures are trading at **8.00 cents/lb.** In order to protect his profit margin, he needs to keep his cash market price from going over **8.80 cents/lb.**

### Strategy:

The refiner buys **2 March 8.00 calls for 0.75 cent/lb.** Each option covers 112,000 lbs. of sugar. The total premium is **\$1,680.**

### Result:

In February, sugar prices have risen as expected. **March futures are trading at 9.80 cents/lb.** The refiner **exercises the 2 March 8.00 calls.** The closing of the resulting futures position at **9.80 cents/lb.** leaves the refiner with a **net 1.05 cents/lb. gain** on the option (1.80 minus the premium of 0.75). When the **1.05 cents/lb. futures market gain** is used to offset the **9.80 cents/lb. paid for the cash sugar,** the effective price for sugar is reduced to **8.75 cents/lb.** (.05 cents/lb. below the price ceiling established with the March 8.00 call option).

If the price had fallen below 8.00 cents/lb., the refiner's option losses would be limited to the **0.75 cents/lb.** paid for the call option, which would be allowed to expire worthless, while he/she would benefit from a lower sugar cash purchase price.

This option strategy is only one basic example of the wide variety of option/option and option/future combination strategies employed by hedgers and speculators in the world sugar market.

## Conclusion

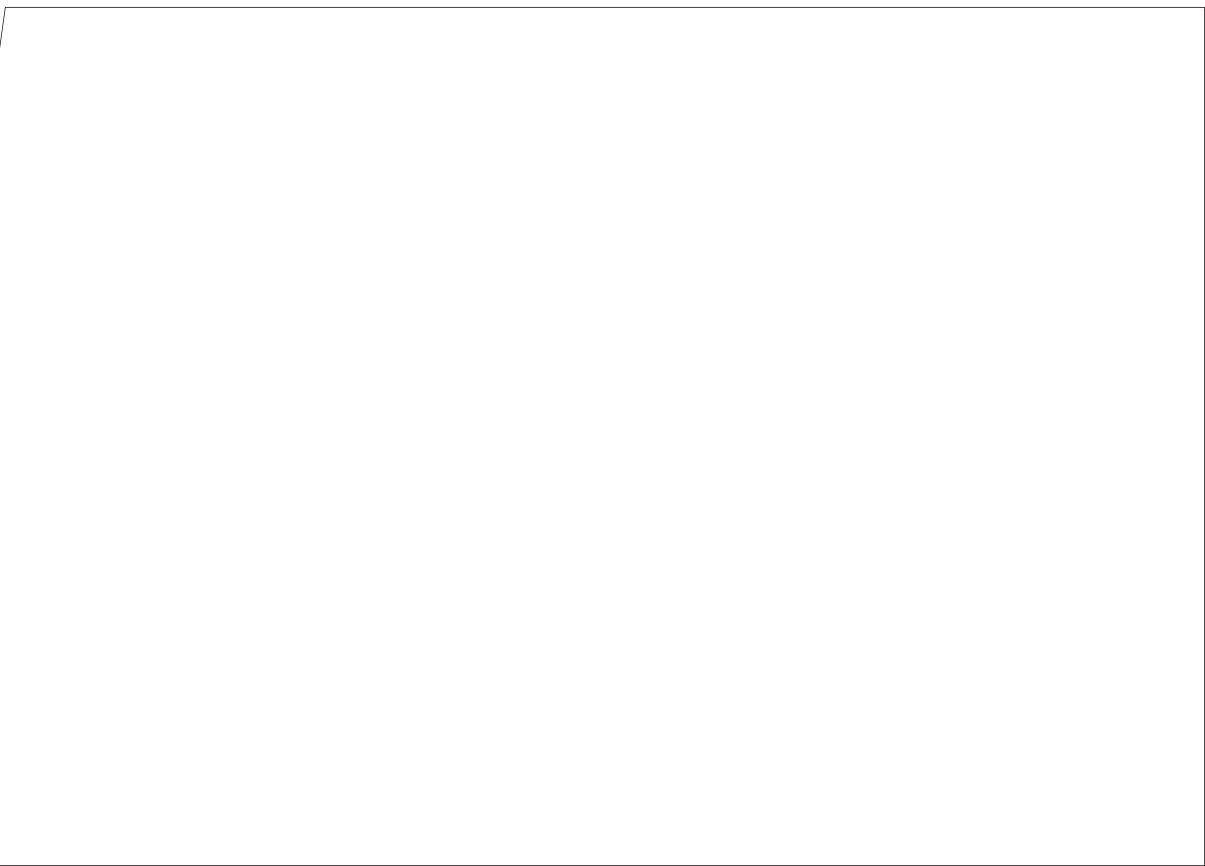
**T**he NYBOT agricultural futures and options markets serve the risk management needs of some of the world's most important commodities industries. They also provide significant investment opportunities.

This brochure provides a brief overview of each of the markets with basic hedging examples. They only illustrate a few of the many strategies available to market participants and should not be construed as trading advice.

The examples do not include trading costs and commissions or current margin requirements. Margin requirements are set by the exchanges and are subject to change. For specific guidance concerning futures and options trading contact a broker. For more information about futures and options trading, send for NYBOT's *Understanding Futures and Options*.

The New York Board of Trade offers a large selection of educational materials and services about futures and options trading for each of its markets. To receive more information on any of the NYBOT markets, contact NYBOT, your broker, or visit the NYBOT web site at <http://www.nybot.com>.

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