Original Paper

Corporate Financial Risk Management Interventions in the Organic Agri-Food Chains

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Abstract

This study arises from the need to propose an alternative solution to existing hedging methods to all companies interested in hedging the price risk of raw materials. The research focuses mainly on the actors of the agri-food supply chains, in particular the organic sector, given the growing trend of the cultivation methodology and the need to protect entrepreneurs involved in short-chain spinneret who have less possibility of relieve higher costs incurred to ensure the sustainability of the product. However, our analysis envisages a customizable hedging method for any company that intends to protect itself from the price fluctuations of the commodity that represents the inherent nature of its business. The technique consists in the construction of specific contracts (in particular, derivative financial instruments) by investment banks or commercial banks oriented to the corporate segment that offer this service. Personalization is achieved by calibrating the constituent elements of the derivative on the basis of hedging needs. The parameterization is carried out by replicating the contractual specifications of the main futures on commodities listed on regulated markets. This will allow the creation of a combination of option contracts listed on the over-the-counter market in an overall strategy aimed at medium-long term hedging.

Keywords

hedging risk strategies, structural finance, organic food supply chains, commodity futures, graphical option analysis

1. Introduction

It is increasingly difficult today for a company to make correct predictions on the price trend of the raw material they procure. Price fluctuations can be considered innate in the commodity market, as they are linked to the real availability of agricultural raw materials, i.e., the size of supply and demand, as well

as the variables that influence them, such as weather events, climate change and the price of energy. The prices of agricultural raw materials, on a global level, are determined differently depending on the commodity at issue. Sometimes occurring fluctuations are justified by fundamental factors, such as a bad harvest or an increase in demand. Sometimes other external factors such as lack of information, asymmetric information, externalities, conflicts of interest and agency problems can affect commodity market prices. Nonetheless, speculation, price bubbles, and even market manipulation can repeatedly affect prices. The impact that the change produces on company margins generates more or less risk depending on the process of sales and acquisition of production factors, the structure of costs and the revenues of the company and the sector. The risk sometimes occurs when there is an increase in prices, other times in the case of a decrease. The change in the price of raw materials affects almost all companies both directly, through purchases intended for the transformation and sale of products, and indirectly through the increase in energy and transport costs. The cost of each product in a production chain also depends on the cost of its components. To manage negative events, the market has equipped itself with a parachute: insurance against upside or downside, in technical terms, options. These tools make it possible to reduce the effects of these events, but require complex use techniques. The evolution of the financial markets, however, has brought accessibility and simplicity in the use of tools to manage the price risk of commodities; these are financial instruments built ad hoc as part of Corporate Financial Risk Management, i.e. the management of the risk associated with fluctuations in the prices of raw materials to assist companies in planning, managing and neutralizing this risks. Consequent benefits are: simplify company logistics, do not commit excessive financial resources to finance speculative warehouse stocks, fewer constraints in relations with customers and suppliers.

Let's imagine that a company is exposed to the rise in the price of a certain raw material (because it cannot or does not want to stock and must periodically return to the market to procure the raw material necessary to produce) and that it is not possible to vary with the same frequency the final price of the product, with a marginality, therefore, compressed between a fixed final price and a variable procurement cost. Relieving the price increase to buyers is not always possible: for contractual agreements that do not allow a revision of negotiated prices or for not granting competitors on the same market the enjoyment of a price advantage over customers. It is not easy to negotiate suitable agreements even "upstream" with one's suppliers, requiring them to undertake the risk of fluctuations in the price of the raw material supplied. In fact, suppliers are often less subject to information asymmetries and more aware of the variability of trends in specific markets. Supply contracts carry certain risks: the counterparty risk (i.e., the non-delivery of the goods; the non-delivery transforms this risk into that of a change in the price of the substitute raw material), the quality risk (i.e., the presence of discrepancies in the goods delivered with respect to what is provided for in the supply contract; the complaint produces the blocking of the disputed goods which transforms this risk into that of a price change for the replacement goods), the payment risk (or the non-payment of the delivered goods; this

risk could also trigger that of price variation, as the contract goods, still to be delivered, could be sold to third parties at lower prices). In summary, all the risks inherent in a supply contract translate directly or indirectly into a price/credit risk. Among the various options available to farmers and other operators in the agri-food supply chains, that of hedging the risk of prices through futures and option contracts keeps one of the most interesting. Generally, the hedging activity is carried out between spot and futures prices of the same commodity (for example, spot price of soft wheat on the Bologna market and future price of soft wheat listed on the Euronext market). Another way of expressing this fundamental point is to define the hedging scheme as the exchange of price risk with base risk (difference between cash price and futures price). When the base is constant, the price movements are parallel and it is possible to offset the losses or gains on the position in the physical market with equal but opposite changes in the position in the futures market. In this research, however, hedging insurance coverage is provided through the use of the over-the-counter market by an investment bank, which acts as a "risk substitute" in the procurement of commodities, based on a new concept of financing the liquidity necessary for the transaction which allows not only to neutralize the price risk, but to participate in any profits, stabilizing company profitability and managing the risk of volatility. The options, therefore, help companies to protect the value of their investments and their products.

2. Method

2.1 Objectives and Assumptions

This work is mainly aimed at studying the possible ways of managing price risk within the supply chain of the organic sector. Organic farming is by its very nature dedicated to attention to the environment and the productive ecosystem in which it operates. One might think that organic companies, being eco-sustainable and having no purchase costs for chemical products, have lower costs, but this is not the case. The yield of the crops and therefore of the resulting product is lower: following the climatic cycles, there is no certainty about the harvest and that everything grown is actually salable. In organic farming, the risk of adverse climatic conditions and natural disasters also increases: the life time in contact with the soil increases considerably, the food is not harvested prematurely, and this involves greater risks; this means that most of the effort and gains can be lost. In the organic sector, the production cost is higher because there is a higher labor cost; transformation and distribution costs also have a greater impact. Therefore, every operator in the agro-bio sector is even more subject to the risk of price changes. The objective, therefore, is to allow organic farms to neutralize their exposure to upward or downward fluctuations in the commodity price, "freezing" the purchase conditions that it deems favorable at a precise moment and which will allow them to produce and sell the finished product without the risk of erosion of income margins.

In an economic framework such as the present one, characterized by a high volatility of market variables, the effective management of financial risks assumes strategic relevance for the company and

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can often translate into a competitive advantage. The research intends to support companies in identifying the nature of existing risks and in selecting the correct mix of solutions to mitigate the impact of these risks on business margins. The aims are the protection of the financial strength of the company, the protection of its profitability and the sustainable creation of value in a context of "controlled" risk. The supervision and management of the type of risk have a strategic value and the company must be able to expect on a bank that offers the possibility of minimizing it through solutions with a high rate of customization and diversification.

The phenomenon of the variability of cereal prices, in particular, has reached levels that are difficult to manage for the agricultural entrepreneur in recent years. The market is increasingly the victim of international speculations and the fluctuations in the prices of production have been added to the classic variables of uncertainty that govern the agricultural business: the meteorological trend, the quality and cost of technical means, the effectiveness of normal cultivation activities. To better explain these processes we will try to use some elements already disclosed in the theories of M. Friedman and the monetarists of the New Classical Macroeconomics (Lucas, Sargent, & Wallace). As has already been observed, agents no longer operate in a deterministic context, but rather in a stochastic environment, characterized by continuous random exogenous shocks: prices are flexible, supply presents characteristics of rigidity and there is the formation of short-term equilibria; however, this equilibrium is not necessarily fully employed precisely because it is influenced by shocks (of supply or demand, monetary or real): the existence of shocks causes the supply and demand curves to shift continuously over time with respect to their natural location, whereby prices are disturbed by the "normal" equilibrium position (i.e., the long-term position); agents must in fact make choices conditioned by perceived market signals and available information. Each balance is the result of choices made in the presence of imperfect and asymmetrical information. Nonetheless, the information is not sufficient, since it is based on past data to formulate hypotheses on future trends. For farmers, the ability to manage risk is therefore limited to adhering to contractual forms managed by industry. In general, we try to "fix" the price today. To do this, the canonical methods are: purchase on the physical market; the forward purchase or sale (forward) or the use of Futures; the purchase or sale of options. The first case is the classic one: if you need a certain quantity of wheat for a certain future date, you buy it today or as soon as the market price is considered appropriate, and so the price is fixed. This strategy avoids the risk of a price increase in the timeframe from the purchase date to the expiry but does not protect against the inverse risk, the fall in price over the same period of time. Thus, in the present study we want to examine what happens to the prices of real goods, in the specific case wheat, if we assume a different use, commercial or speculative, of the derivatives constructed with the wheat itself as underlying. All this in light of the different purposes that derivatives can pursue: the original hedging purpose, used to reduce the overall risk; and the speculative one, aimed instead at obtaining the maximum possible profit by taking positions consistent with one's expectations on the future trend of

prices. The objective will be achieved mainly through the use of GOAL-Graphical Option Analysis® web application. In the context of project finance and, in this case, the function of constructing derivative contracts, complex strategies are created ad hoc, based on the specific needs of the companies that face the above risks. Many years of experience on the financial markets and the availability of privileged information are certainly of primary necessity, characteristics that only professionals and consultants in the sector possess.

The financial sector has developed new products that allow institutions and businesses to invest in commodities through long-term index funds, Over-the-Counter (OTC) swap agreements, exchange-traded funds and other structured products. These instruments have a common goal: to provide investors with buy-side exposure to the returns of a given commodity price index. The GSCITM (Standard's and Poor "Goldman Sachs Commodity Index") is one of the most widely used indices, and is generally considered an industry benchmark. This index is calculated as the production weighted average of the prices of 24 markets forward on commodities. Although the index is well diversified in terms of the number of markets and sectors, the weighting of production translates into a weight of the energy sector of 19.29% for the traditional agricultural sector (source: S&P Dow Jones Indices: S&P GSCI Methodology, June 2021) But most financial institutions and clients would find it difficult to purchase futures contracts to an extent that mimics an index (essentially, due to the enormous cash needed to maintain positions on the market). Alternatively, a company can ask an investment bank to structure a derivative for hedging purposes, in order to compensate for the volatility of some cost components of the production process: first of all, the variability of the price of the commodity object of its activities. For simplicity, we assume at the moment that the transaction does not provide for either gains or losses, but only the sterilization of the price risk. The merchant bank, therefore, estimates the mutability of the price in the future period, plus any margin. Therefore a "protection contract" is stipulated, the Commodity Future, with a strong customization component to meet the specific needs of the customer, and regulated at precise deadlines. An initial margin is paid: in particular, the initial guarantee margin is required to cover the theoretical liquidation costs that, in the event of insolvency, should be incurred to close the operator's positions. The amount of the initial margin does not correspond to the value of the position (another advantage of the futures contract) but only to a part of it: the one that is adequate to cover the cost of liquidating the portfolio in the most unfavorable market scenario reasonably possible. An analysis of the possible derivative instruments suitable to constitute the derivative strategies that will obtain their exposure in the OTC market continues. At the basis of this decision there is always a forecast estimate regarding the evolution of the economic quantities linked to the underlying in the period between the trading date and the expiry date. In turn, the bank will enter the market by taking the positions analyzed. Since the payoff of structured derivatives (indexed to the commodity of reference) will change the day after the start of the protection contract, the payment of a maintenance margin (Mark to Market) is also envisaged on the basis of

which the party that has lost deposits the differential to the other. In this way, the risk of default is mitigated and the regularity of the settlement is continuously ensured. From this we can immediately deduce the advantage of lower capital use, a factor that contributes to better business planning and the reduction of the volatility of the company's characteristic results.

2.2 Materials and Methods

It is now clear that, with a view to prudent and responsible conduct of the company, management can mitigate the risks of fluctuations in commodity prices through transactions in derivative financial instruments. The structured finance offices of the corporate banks have defined specific risk management policies that provide for the use of derivatives normally used in commercial practice. In this regard, the study aims to offer a method that constitutes an advantage for both contracting parties, so that banks are able to assist their production company customers with derivative products aimed at supporting the strategic paths of the company, elaborating innovative specialist solutions. Extensive reference has already been made to commodity derivatives, contracts that can be adapted to the specific needs of the company for hedging the risks of fluctuations in the prices of raw materials. However, it must be kept in mind that this product is aimed at customers who: have an adequate level of knowledge and experience to understand the characteristics of the product; need to carry out operations to hedge the financial risks associated with their economic activity; have a time horizon not exceeding the duration of the financial risk to be covered; have a risk tolerance compatible with the riskiness of the product intended for coverage. Contract design then becomes a combination of what is economically and technically feasible, knowledge of client's preferences and investment opportunities. This paradigm requires operators to develop an understanding of the objectives of potential users and place targeted and specific contracts on the market to meet heterogeneous needs. In this context, customization can represent the most suitable solution.

In addition to the standardized derivative instruments commonly traded on the futures markets, it is also possible to enter into numerous specific, non-standardized and non-negotiable contracts on the financial markets. However, these contracts can be negotiated on particular markets, called OTC, Over-the-Counter, through appropriate procedures that are often not formalized. The obvious advantage of this type of contract is the possibility that operators have to limit trading uncertainty due to price fluctuations even for those commodities that are not commonly traded on the financial markets. The valuation methodology provides for the identification of a commodity benchmark that can approximate the price of the underlying subject of the specific contract, applying the spread between the value of the contract and that of the commodity that acts as a benchmark on the date of signing the contract. Both elements have the same maturity with spread measured between the start date of the contract and the valuation date. The price of the commodity is fixed by choosing strike prices deemed suitable and convenient for company management. This will then be the element that at the future date will determine the convenience of the entire procedure. The applied model estimates the market value of the

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protection contract reflecting the counterparty risk.

As anticipated, the implementation and evaluation of the best risk management strategies will be carried out with GOAL (Graphical Option Analysis) web application accessible at: https://goal.ago-goal.it/. This financial software allows you to assess the risk of investing in derivative instruments with the aid of highly customizable graphic representations of the payoffs as the prices of the underlying contracts vary, processing the characteristic elements of the market. It is therefore possible to prepare hedging and correction portfolios or speculative strategies in order to estimate the payoff trend at several dates selected by the user at the same time and at different volatility values, by plotting the Profit & Loss curves and a series of linear combinations of them, selected by the user.

With GOAL® in this work will be carried out the construction of the constituent elements of the contract, their parameterization on the specific needs of coverage, the simulation of market shocks and, above all, the selection of suitable hedging strategies. This is a process based on volatility, on expectations regarding the underlying asset, on the investor's risk bent and on the quantification of the expected payoff. The critical issues to consider concern, first of all, the seasonality of the commodity. In fact, to carry out a correct analysis of the wheat production and marketing chain in Italy it is necessary to describe the complex production storage system and the stipulation of specific contracts. It should be noted that the production cycle of the raw material in question is annual: at our latitudes it is possible to obtain only one production per year and the quantity is quite variable. Consumption, on the other hand, whether it is the production of semolina or hard flours, proceeds throughout the year, so that the constant supply is essential for modern industrialized mills. The sudden and wide fluctuations in commodity prices, the progressive growth of production costs and the structural dependence of raw materials from abroad highlight the criticalities in the functioning of the durum wheat supply chain. With the use of GOAL®, a new type of contract is put in place to guarantee farmers the necessary tools to successfully face the cereals market by managing their risk from day to day activity in the short-medium term up to risk management long-term strategy.

It should be emphasized that there is no type of coverage valid for all categories of economic operator in the context to which we intend to refer; indeed, each operator in the supply chain, according to the type of activity it carries out, requires specific and appropriate coverage. Thus, in the case of the farmer, in order to define the optimal coverage ratio and evaluate its corresponding effectiveness, it is necessary to take into account both the periods of the year in which sowing and harvesting take place, and the length of the interval between these two periods (which vary according to the cultivation practiced and the climatic characteristics of the territory). In this sense, for the entrepreneurs of the agri-food supply chains, the covers have their own characteristic seasonality. The hedge can (and should) also be used by traders and industrial converters present along the supply chain, for two reasons: 1) the possession of raw materials does not give rise to the accrual of interest; 2) the possession of raw materials involves storage costs. It follows that the holder of the goods will have to

face: 1) costs of storage, conservation, custody and insurance of the goods; 2) deferred rather than immediate revenues, with consequent financing costs. The latter assumption can be represented with the following formula (N.C. Schofield, 2007):

$$F = (S+M)\, xe^{IxA} \ (1)$$

where: F = Futures Price; S = Underlying Value, Spot Price; I = Interest Rate; e = Natural Number, equal to 2,71828; A = Number of Years or Fraction, M = Monthly Cost of the Warehouse for the Number of Months Between the Physical Delivery of the Goods.

The first part of the costs listed above is represented by item M, while the second part relating to financing costs is given by item $(S+M)$ which is increased by the interest rate. The attitude on the part of the holder of the goods, in the event that the price of the future curve does not compensate the costs for forward delivery of the goods, will be such that there will be a massive spot sale and a lack of forward sale. This will lead to a spot oversupply, with price depression, and a forward shortage, with a rise in prices, with the consequent rebalancing of the forward curve based on the supply and demand ratio. The variability of spot prices depends on price fluctuations in the market and measures the actual price risk that farmers, traders and industrial processors face. A hedge cannot completely eliminate the effect of price risk on income, it can only reduce it to the extent that, in the hedging range, the variability of the base (calculated as the difference between the future price and the spot price) is less than the variability of the spot price only. For this reason, entrepreneurs can rely on the bank, which takes positions in derivatives on the over-the-counter market to obtain the desired exposure to the returns of the commodity benchmark, in particular to the rolling-type return, i.e., that associated with the replacement of the expiring futures contracts that allows you to maintain the position on the underlying. Contributes to the enhancement of the protection contract the verification of the *optimal hedging ratio* (Myers & Thompson, 1989), defined as the share of futures contracts on cash transactions that maximizes the objective function relating to positions on the physical market (the actual quantitative of raw material covered by the contract) and on the over-the-counter market. The profit at time *t* of an agent taking positions on the two markets at time *t-1* is given by:

$$\pi = p_t q_{t-1} - (f_t - f_{t-1})b_{t-1} \ (2)$$

where q_{t-1} = Physical Market Position at Time *t*-1; p_t = Price of the Goods at Time *t*; f = Quotation of the Futures for Some Maturity After *t*; b_{t-1} = *short* position, or Sales on the Futures Market. In the mean-variance framework, the agent will maximize a function of the mean and variance of the profit conditional on information X_{t-1} available at time *t*-1.

2.3 Case Study

Let's consider the case of Molino Zeta, a hypothetical Italian company that transforms wheat into flour and semolina, the main ingredients of pasta and bakery products. It should be noted that the operators of the bread-making wheat supply chain have different interests and objectives for risk management. For example, in addition to the price risk, farmers also face the risk of yield, and have an interest in

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setting the price of wheat as high as possible. The milling and bakery industry, on the other hand, does not face a risk of yield, rather it can be susceptible to a supply risk in thin market phases and also faces the price risk. Its interest is to ensure supplies of a given quality at the lowest possible price. The enhancement of production rarely occurs at the time of delivery, both due to the farmers' willingness to "look for the moment" and therefore the best price, and to minimize the risk of strong fluctuations in the price for the stackers who will sell the goods in a very long period. Therefore, in fact, the producer on delivery no longer has the availability of the goods, but will know the price and will collect the sum only several months after delivery, signing a sales contract with a price to be determined. To avoid these problems that sellers and buyers of grain (or commodities, in general) face, the need for this work has arisen: the agricultural entrepreneur must take advantage of the best market conditions and, at the same time, protect himself from unpredictable factors. Nobody can predict the future, but thanks to protection contracts it is possible to transform a chronic problem into a real opportunity. For the durum wheat supply chain, despite the recent creation of the AGREX market, the volume of traded transactions seems decidedly reduced. This may be due to a market particularly thin, high transaction costs and presence of few professional financial intermediation institutions (Revoredo-Ghia & Zuppiroli, 2013).

Let's go back to the case of Molino Zeta: the milling industry in question develops a turnover of about 82 million euros (figure for the 2019 financial year), which is concentrated for about 60% in the production of organic flours. The company has been present in the world of the organic sector for about thirty years (with a turnover in 2019 of about 56 million euros from the organic food sector alone) and has an export capacity equal to 25% of turnover. The future challenge facing the Zeta industry is to increase export shares, especially in the United States. In its overall processing, the purchase of the basic commodity (wheat) affects the budget for 70%. The receipt of the raw material is concentrated in a single month. Hence the need for proper management of the entire purchasing phase, which requires large amounts of liquidity, especially considering the uncertainty about the volatility of the price of wheat over medium-long periods. Given this company presentation, taking into consideration the prices of the raw material we want to analyze, we should immediately make some clarifications: the price of wheat in general must be distinguished at least in durum and soft wheat, of national or foreign production. The identification of a reference price can be done on the basis of individual markets or on a national basis; on a time basis from weekly to monthly or yearly. Generally, the price recorded is the prevailing one, i.e. the price at which the greatest quantity of product is traded, and undergoes numerous surveys in Italy by the Chambers of Commerce, the Commodities Exchanges and the ISMEA with its own network of detectors (Form Sector ISMEA - ISTITUTO DI SERVIZI PER IL MERCATO AGRICOLO ALIMENTARE, November 2020). So let's suppose that Molino Zeta has to buy five thousand tons of fine bread-making wheat in March 2022. The current price of the commodity (May 2021) registered on the Bologna market is € 242.50 / ton. The total liquidity that the company must

have will be as follows: € 242.50 * 5000 tons = Euro 1,212,500 (which is the cost of the entire purchase of the commodity on the physical market if it happened in May 2021). Molino Zeta then calls on the Corporate office of its bank, asking to start hedging operations for the aforementioned purpose. The bank structures a protection contract consisting of a *Commodity Futures* and a *Commodity Option* contract using as commodity benchmark the underlying CHICAGO SRW WHEAT (ZW) listed on the Chicago Mercantile Exchange (CME) which has the following contractual specifications (source: https://www.cmegroup.com/markets/agriculture/grains/wheat.contractSpecs.html):

Table 1. T Contract Specs Chicago Srw Wheat Futures (ZW)

CONTRACT UNIT	**5,000 bushels (~ 136 metric tons)**
PRICE QUOTATION	U.S. cents per bushel
TRADING HOURS	**CME Globex:** Sunday – Friday: 7:00 p.m. – 7:45 a.m. CT and Monday – Friday: 8:30 a.m. – 1:20 p.m. CT **TAS:** Sunday - Friday 7:00 p.m. - 7:45 a.m. and Monday - Friday 8:30 a.m. - 1:15 p.m. CT **CME ClearPort:** Sunday 5:00 p.m. - Friday 5:45 p.m. CT with no reporting Monday - Thursday from 5:45 p.m. – 6:00 p.m. CT
MINIMUM PRICE FLUCTUATION	1/4 of one cent (0.0025) per bushel = \$12.50
PRODUCT CODE	**CME Globex**: ZW **CME ClearPort:** W **Clearing**: W **TAS:** ZWT
LISTED CONTRACTS	15 monthly contracts of Mar, May, Jul, Sep, Dec listed annually following the termination of trading in the July contract of the current year.
SETTLEMENT METHOD	Deliverable
TERMINATION OF TRADING	Trading terminates on the business day prior to the 15th day of the contract month.

The construction sheets of the customized derivatives structured on the specific needs of Molino Zeta and on the basis of the ZW benchmark with the ad hoc characteristics are shown below (Note 1):
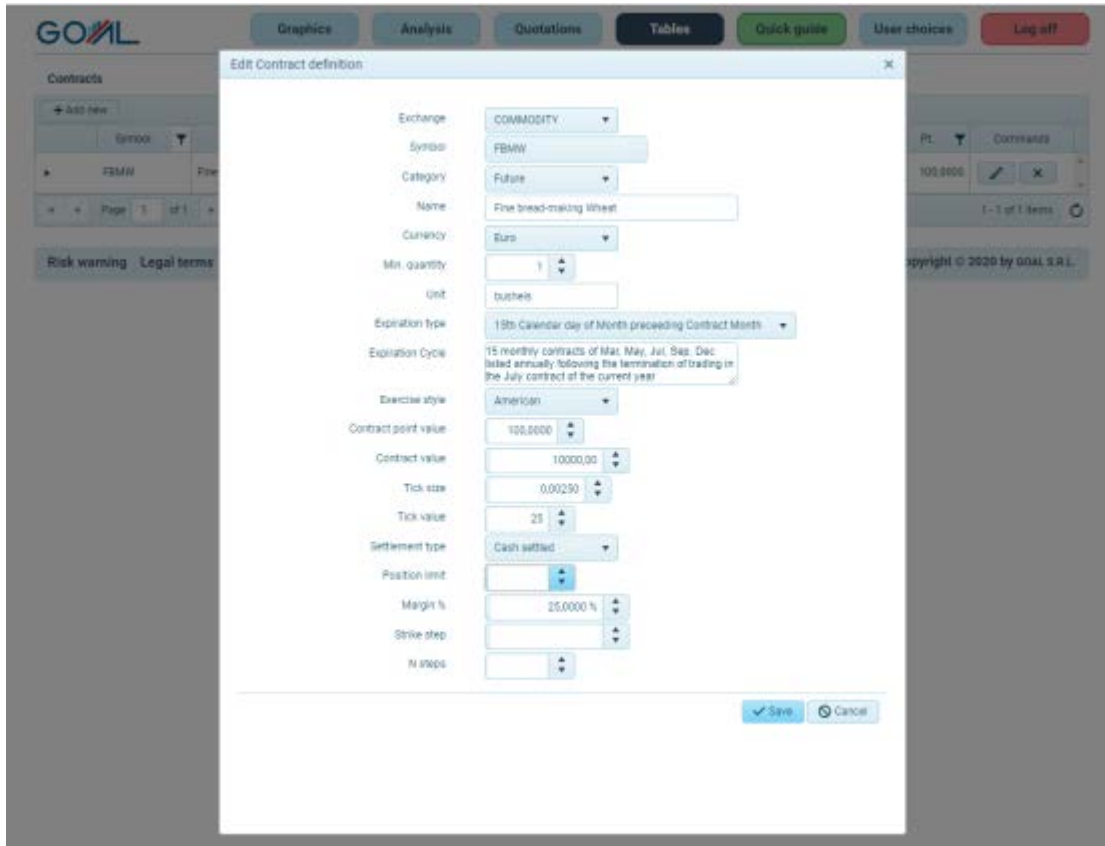
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Figure 1. Contract Specs Commodity Futures

Figure 2. Contract Specs Commodity Option

From the Commodity Options contract, the bank builds a simulation of option chains considering the date of purchase of the grain (March 2022) as expiry and standardizing it to that of the benchmark (14/03/2022), assuming that the underlying (i.e., the FBMW Commodity Futures on soft wheat for bread making) can take on price values in a range between 240 euros and 300 euros per ton:
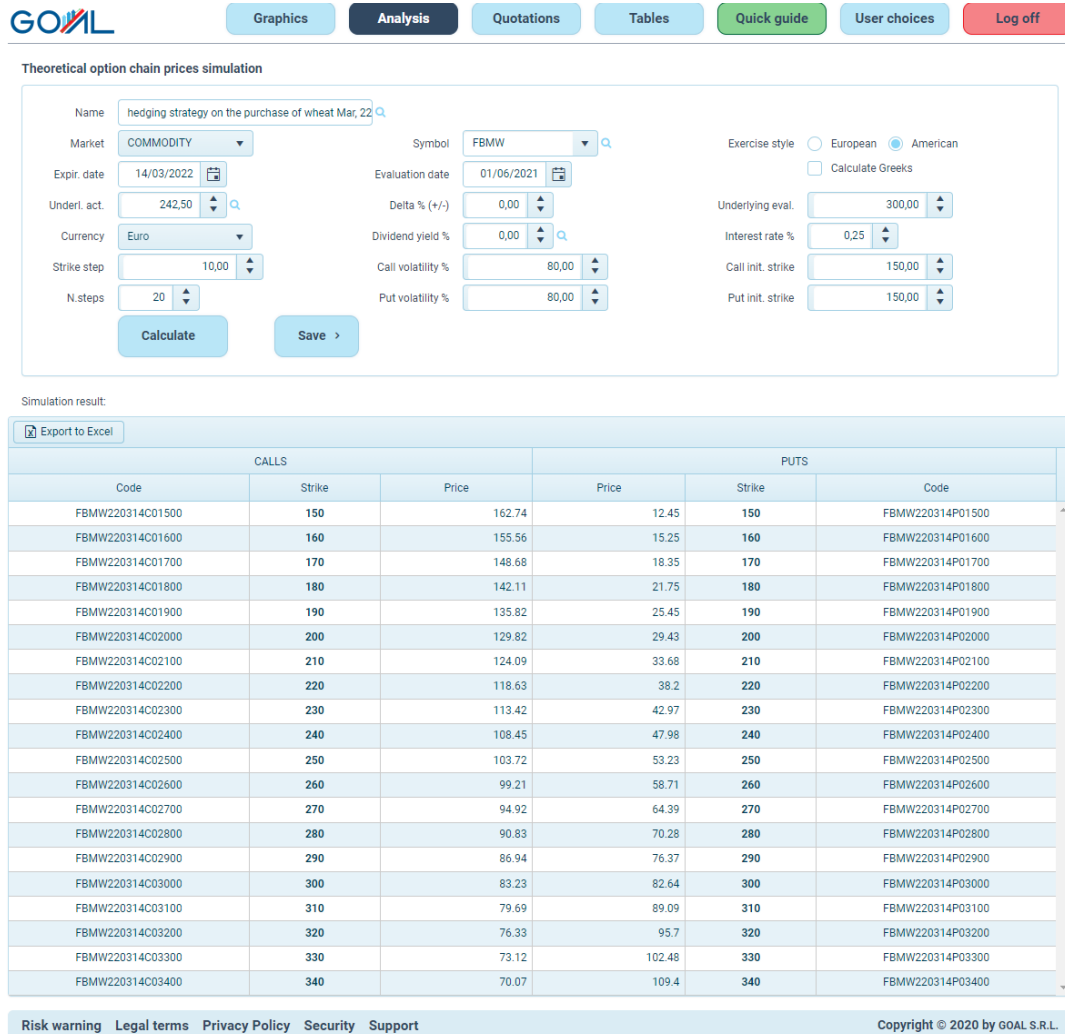
Figure 3. FBMW Option Chaim Simulations

Once these elements have been acquired, the bank's service achieves the real "protection" with the formulation of the overall strategy in options. The assumption for insurance purposes involves hedging the downside risk by taking a long position (BUY) and hedging the upside risk with a short position (SELL). The positions chosen by the simulated option chains, with the theoretical price recalculated on the value of the implied volatility of each option, which represent the best insurance strategy are the following:

Table 2. Positions Chosen for the Protection Strategy of the "Molino Zeta" Case

SIGN	QUANTITY	TYPE	STRIKE	PRICE
SELL	1	CALL	240	63,38
SELL	1	PUT	240	60,47
SELL	1	CALL	300	75,81
BUY	1	PUT	190	4,37
BUY	1	CALL	190	57,19

which are transformed into real protection contracts that will be listed on the OTC market. With reference to the benchmark, the interest rate expected for the transaction is that decided by the Federal Reserve updated in June 2021 (https://tradingeconomics.com/united-states/interest-rate). The implied volatilities of each option were obtained with the calculation engine of the GOAL®.
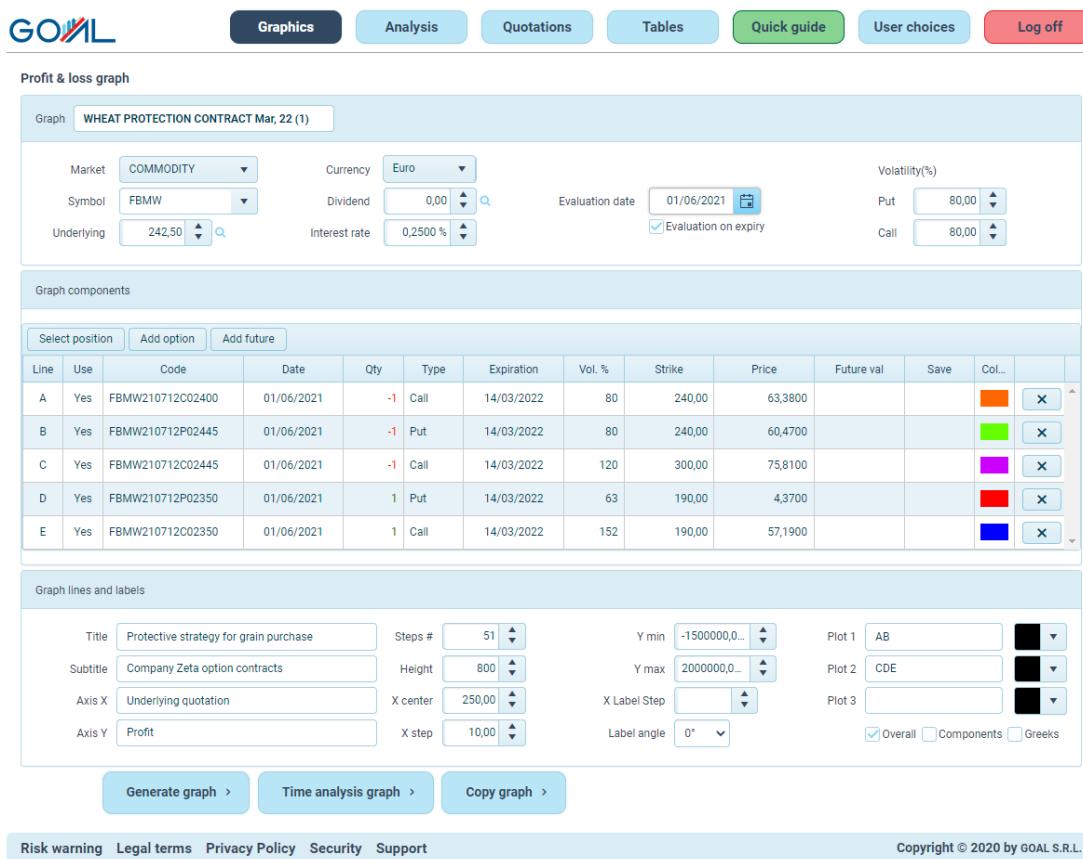

Figure 4. Graph Generation Page—Wheat Protection Contract Strategy March, 22

The evaluation at maturity of the overall payoff and of the single contribution given to it by each of the transactions is summarized in the following graph:

Figure 5. Overall and Single Positions—Wheat Protection Contract Strategy March, 22

From the overall payoff (TOTAL line in blue) we learn that the strategy thus created would allow Molino Zeta to obtain a profit of 1,880,000 euros in a structured commodity futures price range of between 240 and 300 points. With this amount, the company would obtain all the liquidity necessary for the purchase of the entire quantity of soft wheat up to bread-making ordered, at the price agreed with the bank (the one registered in the Bologna square in May 2021) and deemed convenient by Molino Zeta; while the bank, assuming the risks of upside or downside, would find itself financially covered even if the price of soft wheat were to rise (on the expected expiry date of March 14th, 2021) up to €376.20 (Note 2).

The evaluation of the contract-protection trend can be conducted and modified in the course of work with the display of the payoff curves observed at multiple dates at the same time, chosen as intermediate periods of analysis and possible intervention on the OTC market:
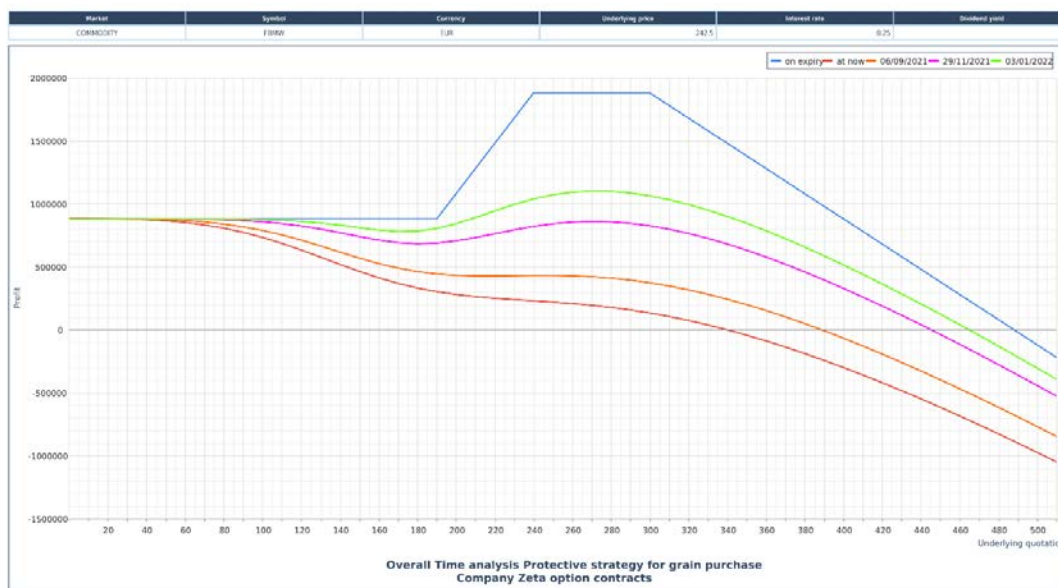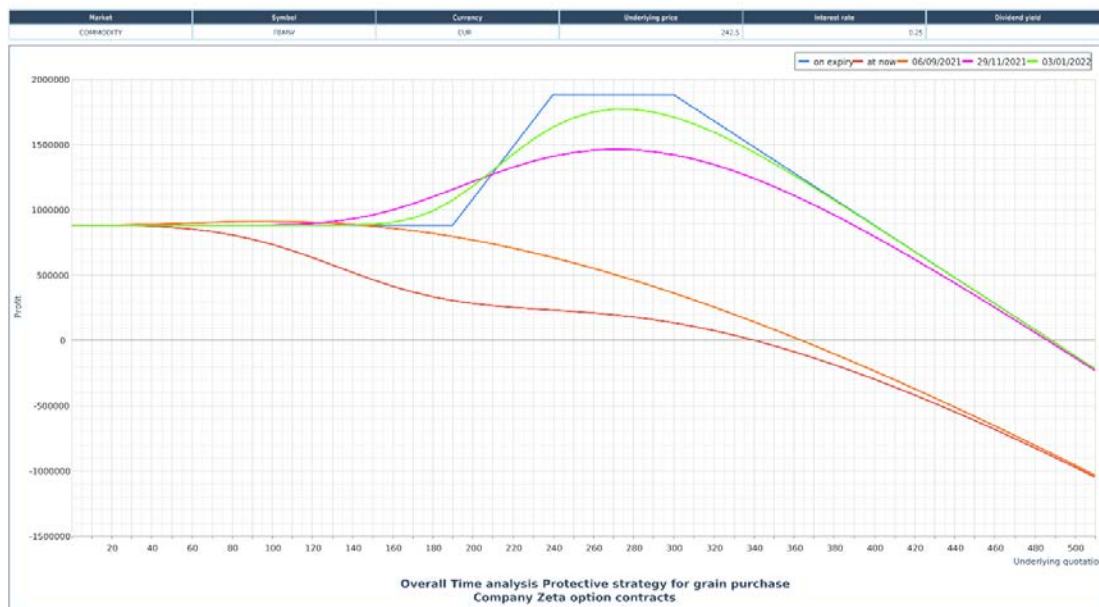
Figure 6. Overall Time Analysis—Wheat Protection Contract Strategy March, 22

Further, the same survey can be coordinated by assuming market shocks that affect the implied volatility, calculated on the Call and Put At-the-Money at that particular moment. In the payoff chart below, the following volatility changes have been assumed:

Table 3. Implied Volatility Shock for the Protection Strategy of the "Molino Zeta" Case

EVALUATION DATE	PUT VOLATILITY %	CALL VOLATILITY %
AT NOW	80	100
SEPTEMBER 6th, 2021	100	150
NOVEMBER 29th, 2021	40	20
JANUARY 3rd, 2022	60	60

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Figure 7. Overall Time Analysis and Volatility Shocks—Wheat Protection Contract Strategy March, 22

From the more "asymmetrical" payoff curves compared to those in the previous image, it is evident that the variability of the strategy yield shows a higher degree of risk in the intermediate dates. Indeed, periods characterized by high volatility represent a bearish movement of trading (Mandelbrot, 1963) on the Over-the-Counter market, a sign that the contracts should be recalibrated by acting on the parameters that influence the price (and therefore the protective strategy as a whole).

3. Result

The protection contract presented in the case study gives the entrepreneur the certainty of having defined a safe value, regardless of market fluctuations. At the same time, the Entrepreneur will be able to participate in any increases in market prices and obtain the liquidity available before the expected date of delivery of the goods by the supplier. On the other hand, with the use of a DSS (Decision Support System) software such as the one used in this research, banks can know in advance the counterparty risks, make quick decisions taking into account company operations and related need for flexibility of intervention, which derives in particular from the volatility of the markets and the promptness of reaction required. A further advantage to support decisions is the ability to study the effects of price risk management operations on customers' balance sheets. Indeed, for financial instruments traded on OTC markets, characterized by a knock-out clause that provides for the termination of the contract when the instrument reaches a certain target rate, the valuation is carried out using fair value valuation models, as referred to in the 'OIC 32 "Derivative Financial Instruments" (Organismo Italiano di Contabilità, 2016).

The use of protection contracts could provide a non-marginal contribution to reducing the variability of the economic results of operators in the cereal supply chain, especially in periods of strong market turbulence and for medium-long periods. It could be possible to plan the purchase of production factors at a good price, protected from speculation, and at the same time have the opportunity to participate in market rises. The use of tools with a high rate of customization would allow operators in the agri-food chain to cover themselves from unwanted variations, thus promoting better planning of the activities of the supply chain. In particular, producers can fix the price of crops that have not yet been sown or matured by hedging themselves against the risk of negative price changes, thus focusing on production management. Mills and industrial companies can stabilize the costs of raw materials by setting their margin in advance and optimizing production planning.

4. Discussion

Successful contract innovation is based on the assumption that goods are stockable, homogeneous, subject to large price fluctuations, with ample liquidity, an unlimited supply flow with low delivery costs and a futures market. Black (1986) defined a successful contract as one that keeps both the volume of trades and open interest constantly high, and concluded that the success of the contract derives from the size of the market, the volatility of the price, the ability to reduce the risk and liquidity costs (Black, 1986).

The current market requires greater professionalism than in the past: operators need the necessary skills to perfect the control techniques to ensure the best coverage of your investments on a daily basis. This constant work of research and analysis is made necessary by the awareness that even apparently negligible changes when they occur can lead to different evolutions and important conjunctions in the market (in a reasonable amount of time and in relation to other small changes). In any case, a risk management strategy requires a careful business analysis to decide if, what and how to cover: it is essential not only to know the source and the methods of manifestation in order to be able to manage it consistently with the company objectives, but also to formalize and share the process by which it is identified, managed and monitored.

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Notes

Note 1. Knowing that 1 ton = 1000 kg and 1 bushel = 20 kg, to standardize the unit of measurement of the contract-protection to that of the commodity benchmark, the Contract Unit of the Commodity Futures and the Commodity Option will be set as follows:

1 ton / 1 bushel = 50;

50 * 5000 tons = 250,000 bushels;

to reduce the quotation: 250,000 bushels / 25 = 10,000 bushels; where:

Tick Value = Contract Unit * Tick Size = 10,000 * 0.0025 = 25.

Note 2. Amount representing the break-even point in the highest part of the total payoff, given by:

1,881,000/5000 = 376.20 €/ton.