

UNIVERSITY OF DEBRECEN
CENTRE FOR AGRICULTURAL SCIENCES
FACULTY OF AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT
DEPARTMENT OF MARKETING AND BUSINESS

**DOCTORAL SCHOOL OF INTERDISCIPLINARY
SOCIAL AND AGRICULTURAL SCIENCES**

Director:

Dr Gábor Szabó, DSc

PhD Thesis

**The Role of Public Warehousing and the Commodity Exchange
in the Hungarian Grain Market**

submitted by

LÁSZLÓ KOZÁR

supervisor

Dr László Kárpáti, PhD

DEBRECEN

2004.

Table of Contents

1 RESEARCH OBJECTIVES	6
2 PRELIMINARY WORK AND APPLIED METHODS	8
3 CONCLUSIONS	11
4 SCIENTIFIC DISCOVERIES	24
5 PRACTICAL USES OF THE RESULTS	26
6. PUBLICATIONS	28

Introduction

Hungarian economy, and the agricultural sector in particular, has always had greater importance in European economy than the size of the country or the number of its inhabitants would suggest.

Thus it is not by chance that the country has been named the „pantry of Europe” several times throughout history. The ecological resources and location of Hungary are unequalled in Europe and allow for the production of agricultural goods exceptional both in quality and quantity. The proportion of agricultural lands is high (over 60 per cent) despite its decrease in the past decade. Agricultural lands in Hungary are 23% and grazing lands are 20% higher in proportion to those in the member states of the EU before the accession in 2004. Apart from the high proportion of agricultural lands Hungary has production resources which are invaluable to the country (**Kapronczai, 2002**). The iron curtain prevented Hungary from trading its commodities in historical markets. The reunification of Europe creates an opportunity to re-enter European markets that are greatly changed.

Article 39 of the Treaty of Rome signed on March 25, 1957, taken effect on January 1, 1958 provided for the introduction of a Common Agricultural Policy (CAP) and defines an increase in agricultural production as one of its basic objectives (**Tracy, 1994**). As a result of CAP measures the European Community became self-sufficient but later produced ever greater surpluses due to its over-subsidised agriculture. Formerly, about two-thirds of the budget of the European Community was spent on agricultural subsidies, whereas presently about one half of the budget is spent on agriculture. During the early 1990s each citizen of the 12 countries in the European Economic Community contributed an average of 100 ecus per annum (incomes from revenues less expenses) to the subsidising of agricultural expenditures (**G. Szabó, 2001**). A system as over-regulated as this one did not facilitate the evolution of market conditions or institutions such as the futures market or public warehousing.

Despite the fact that both the commodity exchange and public warehousing in combination with lombard financing evolved in Europe, these institutions have minor significance in the agricultural market of the European Union at present. In other segments of the economy futures market institutions not only exist but flourish. Futures grain contracts are made at

some of the markets, for instance, the Marché a Terme d'Instruments Financhiers (MATIF) which has an extremely low turnover. Public warehousing is in an even worse position in the EU. As a result of regulations in the past decades which were unfavourable as regards the development of market conditions, public warehousing is unable to fulfil its function, although it does exist in a number of countries like Belgium, The Netherlands or Germany.

At the end of June and September 2003 major decisions were reached about the latest (third) phase of the reforms of the Common Agricultural Policy (CAP) initiated in 1992. These changes had an impact on the present agricultural structure of the EU and are vital to the integration of Hungarian agriculture. Moreover, they are crucial to the outcome of the WTO Doha Round. A Common Agricultural Policy is no longer an external factor. (**Halmi, 2003**).

The latest CAP reforms are a result of a review of the decisions reached at the 1999 Berlin EU summit, made at half-time in the 2000-2006 budget cycle in 2003 (MTR). The basis of reform is a decoupling of subsidies (direct payments made up two-thirds of the agricultural budget of the EU) from production in order to channel them into rural development. In the future, 75% of subsidies will be paid regardless of production or type of grain, as a flat rate per hectare. The 19 million Euro subventions in this sector make up the lion's share of the subsidies (**Vajda, 2003**).

The latest CAP reform adopts measures to create a European agricultural market. Naturally, as a result of CAP measures only competitive production will survive since manufacturers are motivated to produce profitable and marketable goods. This tendency will have positive medium-term effects on the development of market institutions. Futures markets will become a necessary element of the agricultural market in shaping market prices whereas public warehousing will be strategic to storage and financing.

Hungary has had a long tradition of both institutions. Five years after the 1848 establishment of the world's first futures grain market, the Chicago Board of Trade (CBOT); the Pest Grain Hall opened in 1853 as the first futures grain market in the Europe. As the Budapest Commodity and Stock Exchange it had the second largest turnover at the turn of the century, surpassed only by the commodity exchange in London. Hungary was the first country to regulate public warehousing by the 1875 Trade Act which was in effect until the Public Warehousing Act was passed in 1996. Public warehousing and the credit system linked to it were an essential part of the agricultural market; both were abolished when the commodity

exchange was closed down. When the political system changed an opportunity arose for their restoration. Both institutions have been re-established, are regulated by law and accepted by the market.

In the past two decades I was the founder and executive officer of the first professional Hungarian brokerage firm, the first private public warehouse, I directed financial, commercial and integrator firms which used these institutions as market instruments. I was a founding member of the Hungarian Public Warehousing Association and of the Budapest Commodity Exchange.

I have led interventional purchases on a national scale as the executive officer of the state company in charge of the transactions and took part in the work of various boards of directors, supervisory boards and several other organisations. I have been involved in education both at the secondary level and in higher education as well as at the postgraduate level. I have also gained an insight into the practices of other countries, such as the USA and several EU countries.

Most of the market regulations were removed during the 1990s in Hungary and conditions became suitable for the development of a market economy. Naturally, the Hungarian agricultural market bears more similarities to the USA than to any of the EU member states. Unlike in the EU, market conditions were not curtailed in the US, therefore, the country has the world's most advanced and accepted public warehousing system and futures market.

Due to the present procedures in the EU the prospects of futures markets and public warehousing in Hungary have become rather uncertain as the country joined the EU. Hungary is ahead of Europe as regards the status of these institutions. However, Hungary's accession to the EU is a one-way process, it is Hungary that joined the EU and it is the Hungarian agricultural policy that will be adjusted to the Common Agricultural Policy.

It may be anticipated that one of the following two alternatives will take place in the next few years. First, both institutions survive and serve as models for the developing market conditions of EU agriculture; commodity exchange might even gain a leading role. Second, Hungarian institutions fall into ruins and are partly or fully restored some years later, parallel to other EU member states. Both the government and market participants hold a responsibility in bringing the favourable alternative into effect. Commercial expertise is available in every

part of Europe since merchants use European futures markets in other segments of the economy, and the Hungarian public warehousing system as well. It is only the futures grain market and the public warehouse system that is lacking or underdeveloped in these countries. Hungary is comparatively more advanced in these areas which should be exploited in order to make sure that Hungarian grain is traded at the Budapest Commodity Exchange and not in Paris, London or Rotterdam.

The present dissertation attempts to serve this goal.

1 Research Objectives

My choice of a research area was greatly influenced by the fact that I have been actively involved in all aspects of these two historic institutions since their re-establishment in Hungary.

My primary objective is to discuss the historical, economic and legal background of these market institutions, their present role in the market and future prospects in the EU. Naturally, these institutions could be the focus of research on their own, however, the unique connections between them call for a joint analysis of them.

A combination of the potentials offered by the two institutions and the utilisation of the two techniques offer further benefits to market members in successful commercial activity and in making reasonable decisions about selling or buying.

Public warehousing and the commodity exchange are recent additions to the Hungarian economy despite their former tradition. They were re-established barely more than a decade ago. Market participants have learnt how they operate and how to benefit from them in practice. There have been no attempts in the literature to describe them in relation to agricultural trade or from the viewpoint of market members. This is probably due to the novelty of the subject. Therefore, my aim is to present the way these institutions are embedded into the economy and their possible interrelations from the point of view of market participants.

This thesis does not intend to analyse the issues on the macro level or discuss agricultural, production integration or exchange rate policies or future changes in EU regulations. Thus, this study focuses on economic correlation and the potentials of the techniques presented.

A conjoint use of public warehousing and futures market techniques is reasonable to any participant of the market: to producers, integrators, consumers, traders and creditors. This dissertation, however, discusses the two institutions and the techniques they offer from the viewpoint of the producer primarily, since of all the market members it is the producers, the basis of the profession, who are the least informed or educated about the subject. The techniques analysed in this paper may assist them in making reasonable decisions about sale in order to make a profit.

A further objective is to present a construction in which lombard financing is combined with hedging to put participants, both the financial institution and the borrower, into a more advantageous position, in order to increase the security of financing and grant larger amounts to the borrower.

Moreover, this study aims at presenting a practical mathematical model which can be used in business calculation and may serve as the foundation of the business decisions of any of the participants. The model was devised based on a database containing all the factors influencing the prices of the grain market. The model helps gain information about prices which is indispensable to reasonable decision making and introduces alternative strategies of price risk management. The calculations and assessment following the discussion of the model are also presented from the viewpoint of the produces in accordance with the other objectives of this dissertation.

Chapter 2 focuses on the historical and theoretical background of the subject at hand whereas later chapters discuss the practical and technical applicability of the model and the results of the calculations.

In summary, this dissertation aims at assisting producers in making reasonable decisions about selling.

2 Preliminary Work and Applied Methods

In accordance with the objectives of this thesis I have done research on public warehousing and the commodity exchange and the potentials of a joint exploitation of these two instruments. I have gained professional experience in this field, collected data, made calculations and created a calculation model. The methodology applied is as follows:

2.1 The Role of Public Warehousing in Market Regulation

I first had an opportunity to study the role of public warehousing in market regulation in 1998 as the president of the supervisory board of Hungaria Public Warehousing Inc. The system was organised, including the preparation and processing of a nation-wide database, logistics, the issuing of warehouse receipts, and financial transactions, by Concordia Inc. As deputy chief executive officer I was personally responsible for all of the procedure. I have access to databases concerning the interventions of all three public warehouses, and I have used these sources as background material to my research.

I paid visits to the Ministry of Agriculture and Rural Development, especially to the Department of Agricultural Regulation and the Agricultural Intervention Centre. Apart from the warehouse databases data has also been collected from the databases of the above offices and a number of different web sources.

Information collected in Hungary is complemented by professional experience gained in foreign lands. I have resided in the United States for a considerable period of time as well as in several EU countries.

2.2 A Critical Analysis of the Banking Practices of Lombard Financing

I have been dealing with lombard financing since 1989. Then, public warehousing in Hungary used to be regulated by the 1875 Trade Act and lombard financing was not applied in banking practices. As the financing manager of an American Company I assisted in the very first lombard financing projects secured by warehouse receipts which were exclusively financed by foreign banks.

I also assisted in the arrangement of the first few lombard financing projects and the planning of internal regulations for a number of Hungarian banks. I have been in contact with several commercial banks in the past 15 years, I have assisted in several lombard financing transactions and being the chief executive officer of a company dealing with production integration and exporting I gained experience as a debtor as well.

Financial data quoted in the study were drawn from four well-known banks. Details constituting business secrets have not been included and references have not been made.

I have also taken part in the preparations of the refinancing loan of Concordia Inc. and personally supervised the lombard financing transactions of the company for two grain seasons. Similarly to the information drawn from banks, data cannot be disclosed in detail and references are not made since it would infringe business secrets.

2.3 The Role of Commodity Exchange in Commerce with Special Respect to Grain Trade

I have been involved with the Commodity Exchange since 1990 and I have been the chief executive officer of a brokerage firm which has been market leader in grain trade. The company specialised in hedging and created a nation-wide network of hundreds of clients including producers as well as a number of large milling companies and international trading companies. Thus, I have become acquainted with several aspects of the applicability of hedging.

I have access to databases of the past 10 years from the company, the information is presented without specification of the names of the clients.

I have also had contact with the Budapest Commodity Exchange which has been another source of data for this thesis as well as the web site of the organisation. I have attempted to gain professional experience and data in this field from other countries as well.

I have visited the Chicago Board of Trade, the leading commodity exchange in the world on several occasions. During my visits I met the president and several other executives and gained first-hand information about the operation of the institution. I have been a guest of

Cargill and La Salle, the largest hedger brokerages in Chicago, thus I had an opportunity to study commodity exchange techniques in operation.

2.4 The Joint Application of Public Warehousing and Commodity Exchange in Lombard Financing

I have examined the potentials of the combination of the techniques used by the two institutions and devised a new financial project.

I have developed a new financial project based on the data and professional experience referred to in previous sections. Numerical data used in the calculations were quoted from actual loans at one of the commercial banks. The project is a combination of two different techniques. On the one hand, the bank uses warehouse receipts as security, as is the current practice in lombard financing. The key element in the construction on the other hand is that futures contracts with the same or longer maturity period as the loan are also used in determining the value of the collateral and as a guarantee. An inter-bank relationship is established between the commercial bank and the clearing house and daily transfers are made in this closed system guaranteeing the value of the collateral regardless of price change.

2.5 The Joint Application of Techniques in Business Calculations by Means of a Calculation Model

Through an analysis of the combination of the techniques of the two institutions I have created a calculation model based on extensive databases which utilises both methods.

The model introduced in Chapter 8 is the product of several years of research. Similarly, information about the public warehousing, commodity exchange and various other factors of the model have also been gathered over several years.

Data about the costs of public warehousing have been drawn from three public warehousing companies, information on commodity exchange costs have been drawn from a brokerage and from KELER Inc., information about price was drawn from futures contracts of the Budapest Commodity Exchange.

Storage costs used in the calculation model were obtained from two warehousing companies, each with a storage capacity of several hundreds of metric tons. Interest rates used in banking practices have been used as the cost of financing. The fees of a qualified laboratory have been used as the cost of quality control. The official tariff of MÁV (Hungarian National Railway Company) have been used as railway costs; the tariffs of two Hungarian transport companies, representative of national data, have been included as trucking costs; and the actual tariffs of ports have been used as port costs. Similarly, the costs of various trading documents have been drawn from the fees of the institutions issuing them.

The model was developed in Microsoft Excel format. The system is able to make specific calculations and may be run on computers that are easily accessible.

3 Conclusions

3.1 The Role of Public Warehousing in Market Regulation

The national **public warehouse system of the United States** functions as the base institution of grain trade in the country and is the most advanced such system in the world. Apart from its primary function it is also an instrument of market regulation. Public warehouses are supervised by USDA (United State Department of Agriculture), thus, the Department has an overview of the national warehousing system and the stocks stored.

The **Hungarian public warehouse system** is a well-functioning system for market members, banks and used to be effective from the point of view of market regulation. It has been an instrument used in business calculations and financial constructions as well as in market regulation. Besides its primary market functions public warehousing has become an instrument of government intervention in the past few years, primarily in the grain and wine market.

The Role of Public Warehousing in Market Regulation with Regard to Current Practices:

- Interventional purchases utilising public warehouses and warehouse infrastructure
- Purchase of warehouse receipts, granting a right of repurchase
- Direct subsidising of warehousing costs

- Governmental subsidies of the costs of lombard financing

A Common Agricultural Policy is carried out through **market regulation in the European Union**. Market regulation is financed by the Guarantee Section of the European Agriculture Guidance and Guarantee Fund (EAGGF). EU market regulation involves a purchase of commodities only, warehouse receipts are disregarded.

In summary, the **future prospects of public warehousing** is as follows:

- After the interventions of 2004-2005 public warehouses will not take part in interventions in the original sense of the term, their involvement will be limited to making their warehousing capacities available for interventional purposes.
- The new intervention system includes components which will upgrade the function of public warehousing as a means of production and trade financing.
- The discriminative element whereby traders were not granted the right to being involved in purchasing or subsidies of public warehousing and lombard financing has been excluded from the system. The new system has created a competitive market. Thus, despite the fact that interventions will not employ public warehousing in the future the function of public warehousing will increase in Hungary due to its role in production and trade financing.
- EU interventional purchasing is a distribution channel which will reduce fluctuations in prices which formerly amounted to 50-100% in Hungary.

3.2 A Critical Analysis of the Banking Practices of Financing Based on Public Warehousing

Public warehouses are institutions which qualify for a limited set of the licences of financial institutions under the Public Warehousing Act. They have **licence to make mortgage loans** by means of using the warehouse receipts they issue as collateral.

The clientele of public warehouses are entrepreneurs with small stocks to whom “client-friendly” service (the issuing of warehouse receipts and payment of loan by the same institution) is of more importance than the actual amount of the loan in relation to the value of the collateral.

Lombard financing is a well-known type of financing in developed countries and the interest rates of lombard financing are relatively low all around the world because of the high liquidity of collateral.

Lombard financing has been made on a scale of an annual 150-180 billion Forints in the past few years.

In general, 70-80% of the face value of the warehouse receipt is financed, however, some banks offer financing at 90% of the futures price if price risk is eliminated by futures hedging.

When market prices increase in relation to hedging the bank risks the entrepreneur will be unable to finance the changing value of the deposit. In this case the commodity exchange gives an advanced notice to the bank and closes the hedge position and the sum paid by the client goes to the bank. Although this is the best financing system in Hungary at present, it is overcomplicated, expensive and puts the producers into a subordinate position. From the point of view of banks, risks are high and the system does not allow for a maximum financing per metric ton.

3.3 The Role of Commodity Exchange in Commerce with Special Respect to Grain Trade

The basic reason futures exchanges were established was to provide a concentrated market and a location for hedging for both producers and consumers.

Futures hedging is a substitute transaction for the actual transaction until the latter is realized. There are two types of futures hedges: short hedges and long hedges. Most of the calculations in this study focus on short hedges.

Options technique is a transaction developed from futures hedging. In essence, trading is done by the options rights of futures contracts. The seller of options sells the options rights of futures contracts to the buyer. There are two types of options: call options (buying) and put options (selling).

The difference between options hedging and futures hedging from the viewpoint of the producer is that in the former case the options fee is deduced from the profit realised. In return, daily price fluctuation needs not be financed, thus, the producer is not risking liquidation.

3.4 A Joint Application of Public Warehousing and the Commodity Exchange in Lombard Financing

Lombard financing secured by warehouse receipts is a financing method used generally in the grain business. There is a type of construction, however, beneficial to both debtors and banks: **lombard financing secured by futures hedging**. This construction is a combination of tools offered by public warehousing and commodity exchange institutions which are used independently today and the debtor is promoted to business partner from the rank of a client.

3.4.1 Stages within the Construction

1. The owner places the commodity in a public warehouse.
2. Both business partners sign a contract with the same brokerage and open an account at KELER Inc. (clearing house).
3. The bank makes a deposit on the account at KELER Inc. necessary to the opening of the position.
4. The brokerage makes a futures selling position for the debtor for the maturity period.
5. KELER transfers the open position to the bank's account.
6. The bank pays the loan.
7. During the maturity period KELER Inc. drafts the daily price difference resulting from price rise and transfers the amount resulting from price fall to the bank's account.
8. At the end of the term of maturity the debtor repays the loan.
9. KELER Inc. transfers the position to the account of the debtor.
10. The futurity of the position depends on the commodity owner and is not part of the transaction.
11. Decision about the release of the stock and the selling of warehouse receipts is made by the owner, independently from the contract.

In this construction financing may be up to 100% of the value of the warehouse receipt less the interest rate, costs of the position and the expected interest of the financing of futures price fluctuation.

The Effect of Futures Price Fluctuations on the Account at the Clearing House

The position is transferred to the bank's account, thus, the bank guarantees that:

In case of price rise the equivalent of daily price differences is transferred to the account. This seems to put an extra load on the bank, in effect, it imposes no extra burden. Temporarily, this necessitates additional financing, however, the value of the collateral also rises in relation to the price rise. The interest of additional financing raises the expenses of the transaction and is paid by the debtor at the end.

In case of price fall the clearing house transfers the equivalent of daily price differences to the bank's account, thus, the collateral is not devalued because interest is earned on the account.

The actual interest is the difference between the financial costs and the financial income caused by price fluctuation.

Advantages of the Construction

From the Viewpoint of the Debtor:

- there is opportunity to receive maximum financing
- there is no fixed deposit, the deposit is provided by the bank
- **the financial risk of daily price fluctuation is taken on by the bank**
- apart from loans, the selling price is also granted by futures hedging

From the Viewpoint of the Bank:

- **warehouse receipts guarantee commodity whereas hedging guarantees its value**
- there is opportunity to offer maximum financing
- fluctuations in exchange rates do not effect the value of the collateral
- financing of price fluctuation is guaranteed, price rise may result in higher financing

3.5 The Joint Application of Techniques in Business Calculations by Means of a Calculation Model

The present dissertation presents a model which assists participants of the grain market, that is, producers, consumers as well as traders.

3.5.1 Inputs of the Model

The main inputs of the model are as follows:

- primary cost, purchasing price and selling price
- exchange rates of foreign currency and EURO
- inputs from storage
- inputs from public warehousing
- inputs from financing
- inputs from commodity exchange
- inputs from port fees
- inputs from quality and health certificate fees
- profit

3.5.2 Outputs of the Model

The main outputs of the model are as follows:

- storage costs
- public warehousing costs
- financing costs
- commodity exchange costs

Commodity exchange costs include all the costs related to futures transactions and any other possible cost.

Apart from a fixed brokerage fee (Bf) the model calculates the cost of financing based on daily price fluctuation.

E1 (Pr+): calculations for negative conditions, that is, exchange rates place hedger into the worst possible position, a 50% payment position, during the whole period.

E2 (Pr-): calculations for positive, profitable conditions. The potential for price rise is equal to

that of price fall. In the latter case price fluctuation generates income and not costs.

E3 (Pr0): calculations presuppose that costs and incomes resulting from fluctuations will eliminate each other.

- railway costs
- trucking costs
- port costs
- agent's costs

3.5.3 Model Calculations

Calculations have been prepared in two stages

- **In stage one** calculations have been made using actual price information from the Budapest Commodity Exchange in order to provide information for business decisions. Calculations for the prices of wheat may be found in Figure 1 below.

Figure 1. Futures prices of milling wheat (May 2004 term) from August 1, 2003 to April 20, 2004.

Ft/t.



Source: Database of the Budapest Commodity Exchange.

Calculations for milling wheat have been made from the viewpoint of the producer, with May term hedging sold in August (2003), and a storage and financing period of 270 days. Purchase was presumed to be made in May, on EXW parity.

Inputs of the Calculation:

Primary cost of wheat:	Pc: 22,000 Ft/t.
Storage:	Sf: 190 Ft/t./month
Fumigation (4 times):	Ff: 220 Ft/t./occasion
Public warehousing fee:	Wf: 35 Ft/t./month
Additional public warehousing costs:	Wc: 25 Ft/t.
Interest rate (BUBOR+2%):	Ir: 13 %/year
Brokerage fee:	Bf: 110 Ft/t.
Interest of daily price fluctuation: (=Ir):	Id: 13 %/year
Expected profit:	P: 1,700 Ft/t.

Outputs of the calculation:

Primary cost of wheat:	Pc: 22,000 Ft/t.
Storage costs:	S: 2,590 Ft/t.
Public warehousing costs:	W: 340 Ft/t.
Financing costs:	F: 2,145 Ft/t.
Commodity Exchange costs:	E: 1,183 Ft/t.
Expected profit:	P: 1,700 Ft/t.
Calculated selling price:	Sp: 29,958 Ft/t.

The 2004 May term futures price is 35,000 Ft, the calculated selling price is 29,958 Ft/t. including a profit of 1,700 Ft/t. The futures price contains a profit of 7,242 Ft. A relevant business strategy is postponed selling, hedging in futures market and obtaining lombard financing.

- **In stage two** the effects of the length of the storage and warehousing period, the financing of daily price fluctuation, interest and exchange rate fluctuation on the calculated price of wheat have been examined.

Inputs of Calculation:

Primary cost of wheat:	Pc: 22,000 Ft/t.
Storage:	Sf: 190 Ft/t./month
Fumigation for 3 months of storage (1 occasion)	Ff: 200 Ft/t./occasion
Fumigation for 6 months of storage (2 occasions)	Ff: 200 Ft/t./occasion
Fumigation for 9 months of storage (4 occasions)	Ff: 200 Ft/t./occasion
Public Warehousing fee:	Wf: 35 Ft/t./month
Additional public warehousing costs:	Wo: 25 Ft/t.
Interest rates (BUBOR+2%):	Ir: 13 %/year
Brokerage fee:	Bf: 100 Ft/t.
Interest of daily price fluctuation (=Ir):	Id: 13 %/year
Expected profit:	P: 1700 Ft/t.
Parities:	EXW
Prompt (minimum) selling price including expected profit:	23,600 Ft/t.; 94.40 €t.

Below are the results of calculations made first with base inputs and then with a change of factors. Results have been compared to prompt selling price and the results from the base calculation.

Base calculation:

Storage:	3 months
EUR exchange rate	250 Ft/€
Interest:	13%/year

The aim of these calculations is to determine the extent to which individual factors influence calculated future selling prices.

Selling price (+ profit) in foreign currency	103.09
Selling price (+ profit) in Forints	25,773

It may be concluded that the additional cost of 2,173 Ft/t. or 8.69 €/t. does not produce a loss at this price level. To realise a higher profit from postponed selling as compared to prompt

selling the futures price needs to be higher.

Further calculations were made by varying the factors. See Table 1.

Table 1. Results of Model Calculations

unit of measurement: selling price Ft-Euro/t.

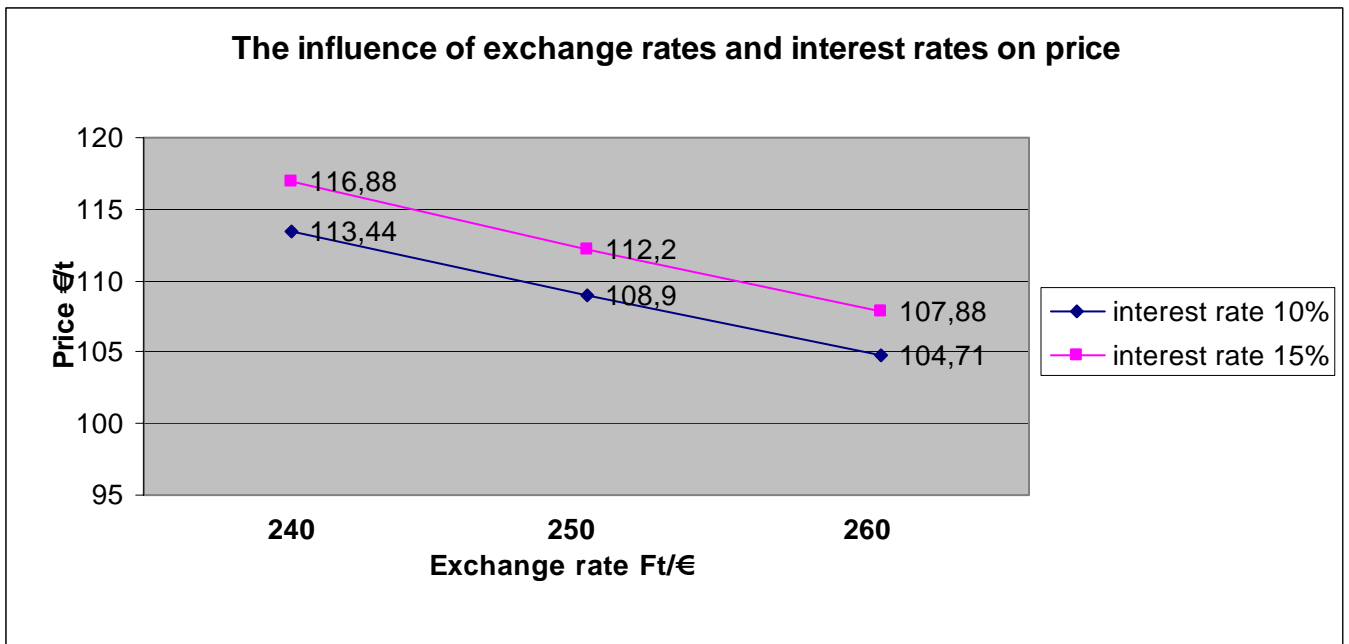
(Macro) Exchange rate	(Micro) Interest	Curren cy	Storage:			Medium term: 6 months			Long term: 9 months		
			Short term: 3 months	Pr+	Pr0	Pr-	Pr+	Pr0	Pr-	Pr+	Pr0
250 Ft/€	10 %	Ft	25,525	25,250	24,975	27,225	26,675	26,125	29,125	28,300	27,475
		€	102.1	101.00	99.90	108.9	106.70	104.50	116.50	113.20	109.90
	15 %	Ft	25,938	25,525	25,113	28,050	27,225	26,400	30,363	29,125	27,888
		€	103.75	102.1	100.45	112.20	108.90	105.60	121.45	116.50	115.50
240 Ft/€	10 %	€	106.35	105.21	104.06	113.44	111.15	108.85	121.35	117.92	114.48
	15 %	€	108.7	106.35	104.64	116.88	113.40	110.00	126.51	121.35	116.20
260 Ft/€	10 %	€	98.17	97.12	96.06	104.71	102.60	100.48	112.02	108.85	105.67
	15 %	€	99.76	98.17	96.59	107.88	104.71	101.54	116.78	112.02	107.26

Assessment of Results

It may be concluded from the calculations that the additional costs of postponed selling after the first period (3 months) are relatively higher due to one-off costs whereas in the next period increase in costs is below linear level. After six months additional costs rise above linear level again due to higher interest rates and warehousing costs. In addition, the interest produced by daily price fluctuations eventually becomes relatively lower and the attainment of a Pr0 state becomes more and more probable.

Figure 2 illustrates the influence of exchange rates and interest rates on price. The graph includes data for medium term storage and financing (6 months) and presupposes a 'Pr+' (maximum) payment position. It may be observed that the influence of exchange rates on price is considerably higher than that of interest rates.

Figure 2



A comparison of these two factors based on their elasticity may be found below.

I have used the following formula in calculating elasticity:

$$\varepsilon = \frac{\frac{f(x)-f(a)}{x-a}}{\frac{f(a)}{a}} = \frac{f(x)-f(a)}{x-a} \cdot \frac{a}{f(a)}$$

ε : elasticity

a = primary data

x = secondary data

f(a,x) = modification induced

ε_i : elasticity (interest rate)

$$\varepsilon_i = \frac{(3,44 + 3,30 + 3,17) / 3 / (113,44 + 108,9 + 104,71) / 3}{(15 - 10) / 10} = \frac{3,3 / 109,2}{5 / 10} = \frac{0,03}{0,50} = 0,06$$

It is to be seen that each unit of change brings about a 0.06% price modification; in other words, the elasticity of interest is almost completely inflexible.

ε_e : elasticity (exchange rate)

$$\varepsilon_e = \frac{(115,16 - 106,295) / 115,16}{(240 - 260) / 240} = \frac{0,077}{-0,083} = 0,928$$

It is to be seen that each unit of change in interest brings about a 0.928% price modification which is still within the range of inflexibility, although it approximates the range of flexibility. An analysis of the relationship between the two items reveals that the two data greatly differ:

$$\varepsilon_i / \varepsilon_e = 15,47$$

Thus, exchange rate fluctuation is more influential on price than interest rate fluctuation.

Change in exchange rates is the most important determinant in postponed selling from the point of view of the producer regardless of the length of the period of postponement and of storage. This risk factor can be eliminated with the futures exchange techniques discussed in chapter 6 of the dissertation.

This study does not intend to set up general rules as to whether the producer should decide on prompt or postponed selling, or the length of the period selling should be postponed. However, information provided by the model is indispensable to well-founded decisions.

Additional costs resulting from postponed selling, especially costs directly related to public warehousing and commodity exchange transactions, can be predicted and calculated both in terms of amount and increase in relation to time, and do not lead to an unrealistic increase in costs.

4 Scientific Discoveries

4.1 The Role of Public Warehousing in Market Regulation

It is in the interest of any state to create a regulated agricultural market, so it is in Hungary as a member state of the European Union. However, Hungary is in a unique position in having an agricultural market and a public warehouse system similar to that of the United States.

The present study compares and contrasts the operation and background of public warehouse systems in the United States, the European Union and in Hungary and their possible roles and uses in the regulation of the agricultural market.

4.2 The Uses of Futures Hedging

Presently, the Budapest Commodity Exchange has an annual turnover of 3 million metric tons. Rise in turnover is hindered by a lack of information about commodity market techniques and

instruments. In order to make up for this deficiency futures and option contracts are explained in this dissertation, their operation is discussed as well as their practical uses. I have devised charts and made calculations using real-life data. The study proves that this method is suitable for stabilising producers' incomes.

4.3 A Joint Application of Public Warehousing and Commodity Exchange in Lombard Financing

This chapter explores the banking practices of lombard financing and proposes the combined use of the two institutions through a new method. The method is novel in the bank financing the project being not merely a passive receiver of the security provided by the warehouse receipt but an active participant of commodity market hedging. Therefore, the value of the collateral is guaranteed. The advantages of the technique is illustrated by model calculations.

4.4 The Development of a New Calculation Model to Assist Decision Making

I have developed a new calculation model to assist decision making which includes the factors of the two market institutions available for market members, futures market and public warehousing, as well as other factors of the grain market. The model can be used by any market member, whether producer, consumer or trader, and provides prompt price information to aid reasonable decision making.

4.5 Generalities Formulated from the Calculations

Calculations compare prices of the two most important grains (wheat and corn) in the past three grain seasons based on data drawn from the database of the Budapest Commodity Exchange. It may be concluded that through the application of advanced price risk management techniques producers can not only stabilise or increase income but also lower risks to a considerable extent.

Simulated calculations revealed that foreign currency hedging is an inevitable component of price risk management and that constant attention to basic economical factors (exchange rate,

interest rate, price, etc) and the utilisation of the calculation model help make well-founded decisions which stabilise and increase the income of the producer in the long run.

5 Practical Uses of the Results

The status and techniques of public warehousing and of the commodity exchange, that is, the operation of these institutions, are discussed separately in the dissertation.

The study aids the participants of real life business transactions in taking the appropriate measures in public warehousing, lombard financing or commodity exchange.

Conclusions of the dissertation are supported by factual numerical data.

The principal achievement of this dissertation is the combination of the two institutions and their techniques and the illustration of the way their joint application is beneficial in lombard financing and the way the calculation model assists decision making.

Lombard financing is the chief determinant in grain marketing, therefore, the construction presented in this dissertation will undoubtedly contribute to the development of financing techniques which will in turn induce an increased commodity exchange turnover. At present, only a fraction of stocks (financed by lombard technique) is secured by futures hedges as well.

The calculation model was devised to be applicable in actual business transactions. It has been constructed in a way that allows all three participants of the grain market; producers, consumers and traders; to adapt it to their needs and use it in their daily decision making.

The model was written in Microsoft Excel format partly because it is a widely used software and partly because it is the most inexpensive system in which these types of calculations can be performed. The model runs on simple equipment (PC, laptop) and even on pocket computers, thus, the model can even be kept in the user's pocket.

The model can be used to design merchandising strategies by analysing factors influencing price and using the results in making decisions about selling. It may also provide the basis of

instantaneous business decision in situations when a decision needs to be reached within minutes or seconds, or even during a phone call.

Finally, I would hope that my thesis will prove to be of practical use.

6. Publications

Books:

- *Amit a közraktározásról tudni kell*, [Facts about Public Warehousing], Szaktudás Kiadó Ház Rt., Budapest, 2002. Co-author: Zoltán Bács
- *Vállalkozások finanszírozása: Határidős tőzsdei ügyletek a vállalkozás napi gyakorlatában*, [The Financing of Enterprises, Futures Contracts in Everyday Business Transactions], pp. 97-115, Campus Kiadó, Debrecen, 2003.
Co-authors: Éva Darabos, Norbert Grasselli, László Kárpáti, Ildikó Orbán, Adrián Nagy, Krisztina Koch, Klára Kondorosi
- *Marketing és Kereskedelem. Kereskedelmi ismeretek*, [Marketing and Trade, Chapter 4, Commerce], pp. 63-77, Campus Kiadó, Debrecen. 2003.
Co-authors: László Kárpáti, Zsolt Csapó, Péter Balogh, Georgina Ványi, Zoltán Szakál, Levente Varga

Essays:

- *A határidős és az opciós hedge nyújtotta lehetőségek a gabonatermelők jövedelembiztosításában*, [The Potentials of Futures and Options Hedging in the Price Risk Management of Grain Producers], Debreceni Egyetem, Agrártudományi Közlemények 10., 2003.
- *A gabona bázison alapuló, energetikai felhasználású etanol előállítás ökonomiai kérdései*, [Economical Problems of Producing Ethanol as an Energy Resource Based on Grain Production], Debreceni Egyetem, Agrártudományi Közlemények 2., 2001.

Papers in International Conference Proceedings:

- Az Észak-alföldi régió gabona termékpályáinak bemutatása, [The Distribution Channel of Grain in the Northeastern Region] Agrárgazdaság, vidékfejlesztés és agrárinformatika az évezred küszöbén. AVA nemzetközi konferencia, Debrecen April 1-2, 2003
Co-authors: László Kárpáti – Georgina Ványi
- A közraktározás szerepe Magyarországon és nemzetközi összehasonlításban. [The Role of Public Warehousing in Hungary as Compared to International Practices], Agrárgazdaság, vidékfejlesztés és agrárinformatika az évezred küszöbén. AVA nemzetközi konferencia, Debrecen, April 1-2, 2003
Co-authors: László Kárpáti – Zsolt Csapó

Posters at International Conferences:

- The Role of Grain Public Warehousing in International Comparison, its Effects on the Financial Situation of Farms
EAAE International Seminar, Ghent-Belgium, 2003.
Co-authors: László Kárpáti – Zsolt Csapó

Papers in Hungarian Conference Proceedings:

- A határidős és az opciós hedge összehasonlítása. [A Comparison of Futures and Options Hedging], Marketing Oktatók Klubjának Konferenciája, Debrecen, 2003.
- A közraktározás szerepe a finanszírozásban – az EU csatlakozás hatása. [The Role of Public Warehousing in Financing – The Effects of Accession], Georgikon Napok, Keszthely, September, 2003
Co-authors: László Kárpáti – Zsolt Csapó

Other:

- Az észak-alföldi régió agrárpiaci termékpályáinak leírása, összehangolt fejlesztési lehetőségeinek feltárása – gabona termékpálya. [An Analysis of the Distribution Channels of the Northeastern Region, Potentials for Development – Grains] NKFP 1. research report, Debrecen (June, 2002)
Co-authors: László Kárpáti – Tibor Palugyai – Georgina Ványi
- Az észak-alföldi régió agrárpiaci termékpályáinak leírása, összehangolt fejlesztési lehetőségeinek feltárása – gabona termékpálya. [An Analysis of the Distribution Channels of the Northeastern Region, Potentials for Development – Grains] NKFP 2. research report, Debrecen (July, 2002)
Co-authors: László Kárpáti – Tibor Palugyai – Georgina Ványi