RURAL ECONOMY

Empirical Investigation of Flexible Pricing and Payment Alternatives on Canadian Wheat Board Pooling for Wheat

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Staff Paper 99-01

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Executive Summary

Background and Study Objective

The Canadian Wheat Board (CWB) has a mandate to serve farm managers in Western Canada by marketing their wheat, durum and barley for export and for domestic human consumption. Currently, under the CWB Act, the CWB operates a pooling system whereby producers deliver grain during the crop year and receive the average price for the quality of grain delivered over the crop year. Upon delivery, the farmer receives an initial payment less deductions for freight and elevation. The Federal government guarantees the initial payment. As grain sales are completed during the crop year, and as the supply/demand and forward price outlook become more certain, upward adjustments can be made to the initial payment. The CWB completes all sales, pays all expenses, and distributes the funds remaining in the pool accounts to farmers as a final payment in January following the end of the crop year. As the final payment becomes more certain, interim payments to producers may be made prior to the final payment.

This system of pooling and payments ensures that each farmer receives the same price for grain of the same quality delivered during the crop year. Hence, it provides assurance that producers will not be disadvantaged due to timing of delivery throughout the crop year. The price pooling system, however, does not recognize the diverse producer needs in terms of risk management and cash flow requirements. The time lag in receiving the final price on delivered grain is identified as a cash flow problem for the farm manager. Additionally, no mechanism is in place to allow managers to lock in a price for grain delivered earlier in the crop year. Despite the initial payment, the farm manager confronts price uncertainty. The final value of the crop delivered to the CWB is not fully determined until after the crop year is over. Moreover, the price uncertainty is larger at seeding time and during the early part of the crop year when information on world production is less available than later in the crop year.

The federal government commissioned a panel in October 1994 to examine Western Canada's grain marketing system in response to the request of farmers to make the system more flexible and responsive. The recommendations of the Western Grain Marketing Panel are embodied in the

amendments to the CWB Act, Bill C-4. This Bill allows pricing alternatives designed to address the diverse cash flow and price risk concerns of farmers. Offering these alternatives to producers, however, exposes the CWB to new risks. Some of these risks are price risks, exchange rate or currency risks, quantity risks, grade spread risks, and counter party risks.

This study describes and evaluates the risks involved in offering Flexible Pricing and Payment Alternatives (FPPA) to farm managers. Farm managers could manage cash flows and price risk using different alternatives. Two types of FPPA - the Fixed Price Contract (FPC) and the Early Pool Cash Out (EPCO) - are evaluated in the study. The FPC is the contract that enables the farmer to lock in a price prior to seeding. The EPCO is the contract that the farmer can sign, after making a delivery, to receive a price now in lieu of the final payment.

The FPC is equivalent to a forward contract on the pool. This contract would enable a farm manager to lock in a fixed cash price prior to the commencement of the crop year, either before or during seeding. When the grain is delivered, the farm manager is paid this fixed price. The grain covered would not participate in any further pool account payments from the viewpoint of the farm manager. To maintain the integrity of the pooling system, the physical grain would still be part of the CWB pool from the CWB's viewpoint and would be included in the calculations of the pool pay out. The farm manager gives up all opportunities for an increase or decrease in the pool value due to changing market prices. The CWB assumes the risk associated with any future changes in pool values.

The EPCO would enable participating farm managers to receive their initial payments when they deliver their grain and then a fixed final payment, prior to the end of the crop year. They would not participate in any additional final payments. This pay out could occur either at any time during the crop year or at the end of the crop year. Again the CWB would assume the risk associated with any future changes in the pool account value.

In addition to describing and evaluating the risks involved in providing the FPPA, this research measures the effectiveness of using public risk markets such as the Minneapolis Grains Exchange (MGE), Chicago Board of Trade (CBOT), and Kansas City Board (KCBT), to manage the risks.

The report evaluates the risk associated with offering the Fixed Pricing Contract (FPC) and the EPCO. In the process, currency risk and grade spread risks are estimated and sensitivity analyses on the results are performed.

Methodology

The methodology employed in this study uses an historical simulation approach. Historical simulations have been used to test models prior to their application. They are able to reveal, in most cases, the strengths and weaknesses of models, thereby allowing adjustments to be made to them prior to their implementation. The methodology evaluates price risks associated with the pricing alternatives using historical data for the years 1993 to 1998 by assuming these alternatives were available in those years. Publicly available data on the Pool Return Outlook (PRO), which is a CWB forecast of pool prices, the Estimated Pool Return (EPR), wheat futures and currency futures between 1993 and 1998 are used to reconstruct how the risks involved in offering the FPC and the EPCO to wheat farmers could have been managed had the alternatives been offered in those years. The simulation process hedges the average price of the pool which farmers receive, such that at the end of the crop year the CWB ideally is in a neutral position.

The methodology uses the Pool Return Outlooks (PRO) to estimate the FPC and the EPCO contract prices. The FPC and EPCO price estimates are then subtracted from the Final Pool price (i.e., the sum of the initial, adjustment, interim, and final payments) to obtain what the CWB would have gained or lost over the crop year in offering the two programs without any hedging programs to manage risk. These values are called the net CWB cash positions in this study. Wheat futures contracts, denominated in US dollars, trading on the Minneapolis Grains Exchange (MGE), the Chicago Board of Trade (CBOT), and the Kansas City Board of Trade (KCBT) are used to simulate a hedging program to manage FPC and EPCO price risks. However, the CWB pays farmers in Canadian dollars. Hence, there are also currency (exchange rate) risks involved in using these exchanges. These risks are managed in the study by using the International Monetary Market (IMM) on the Chicago Mercantile Exchange (CME). The cash positions are then compared with the net wheat hedge and currency hedge positions to measure the CWB gain/loss had these two contracts been offered in 1993/94 through 1997/98 crop years. Since the final grade price spread may differ from the price spreads stipulated in the FPC and EPCO contracts, the contracts will

contain grade risks for the CWB. These risks are also analyzed in the study. Transaction costs are not included in the analysis. However, these costs should not affect the analysis significantly.

Results and Analysis

The results show that the annual CWB price risk associated with offering FPCs on 100,000 tonnes of CWRS wheat ranged from –$5.2 million to $7.2 million over the study period, if no risk management activities were undertaken (see Summary Table below). This breaks down to a range of between -$52 to $72 per tonne. Adding a risk management program utilizing currency futures and wheat futures reduced the dollar range of outcomes from –$0.35 M to $2.6 M on 100,000 tonnes, or -$3.5 to $26 per tonne. These results do not include any measure of grade spread risk.

The EPCO risk is lower. The annual CWB risk from offering EPCOs on 100,000 tonnes ranged from –$0.05 M to $1.6 M, if no risk management activities were undertaken, or from -$0.5 to $16 per tonne. Adding a risk management program utilizing currency futures and wheat futures reduced this range to between -$0.15M to $1.28M per 100,000 tonnes, or to between -$1.5 and $12.8 per tonne. As expected, using a hedging program based on wheat futures and Canada/US currency futures would have reduced the CWB risk over the 1993/94 –1997/98 time period. The risk associated with EPCO is lower than with the FPC. This is principally due to the reduced forecast errors in the PRO and EPRs of the CWB, after the Northern Hemisphere harvests are completed. That is, as the crop year progresses there is less uncertainty about the price forecast on the pool.

Any hedging program to manage the risk of offering the FPC or EPCO will require that the CWB risk management team make assumptions about the expected timing of CWB wheat sales. This leads to two possible issues. First, the CWB risk management team should try to place futures positions to match the expected timing of sales. This will not be directly possible with FPC contracts since prior to seeding, futures contracts with the necessary liquidity are not available over the entire period of the CWB sales program. Thus, some forward rolling of futures contracts from nearby months to more distant months will be required later in the crop year. Second, the CWB has risk arising from the timing of sales. If the actual sales program differs from the expected sales program, the CWB net dollar position could change. However, the CWB in practice will have the

ability to immediately change their hedge program to match the new expected sales program. Different sales timing in the year, however, does change the CWB risk, even when the sales program is matched up with the risk management program. Scenario results using different assumptions on the timing of sales showed up to a $7/tonne change in the CWB net cash position for FPCs and a $5/tonne change in the CWB position for EPCOs. Expected timing of sales, actual sales, and the associated hedge program, will have a major impact on the CWB final cash position.

The pattern of farm participation may also impact on risk. Farm participation may increase or decrease over the crop year. That is, more farm managers may sign up for FPC or EPCO later in the year rather earlier in the year. Scenario analyses of different patterns of farm sign up did not show a consistent set of CWB dollar outcomes. However, it did indicate that this is another source of risk. The CWB net dollar outcome could change by over $5/tonne from the base case scenario.

The MGE wheat futures contract most closely matches the wheat grades evaluated in this study. However, this futures contract is the least liquid of the three wheat futures contracts evaluated. The CWB is a major wheat player and futures market liquidity may be a CWB constraint when managing this program. A scenario that used substantially more wheat futures from the CBOT, the most liquid wheat futures contract, evaluated the impact of increased use of the CBOT contract for risk management. This scenario still reduced the CWB risk but was slightly less affective as a risk management tool. The total size of the FPC and EPCO program will place constraints on the most effective risk management program. Since there is an extremely liquid over-the-counter market in forward contracts for currency, we do not view the CWB's ability to currency hedge as a significant constraint.

Generally, forward contracts specify grade discounts. This is another source of risk and a simple measure evaluated the grade price spread risk between #1 CWRS, #2CWRS and #3CWRS for the FPC. Protein grade risk was not evaluated. In general, the grade price spread risk was smaller than the price risk. It did range from -$2.0/tonne to $2.1/tonne annually. EPCO grade spread risk was not evaluated but it should be much lower than the spread risk associated with FPC.

The CWB needs to determine what risk premium to use when setting the FPC price or the EPCO

price based on the PRO or EPR. The simulation used a Government of Canada discount rate on either 25% or 15% of the PRO for the FPC. For the FPC, the timing of the payments were ignored and the range of discounts on either 25% or 15% of the PRO was used as a proxy for measuring the impact of timing of payment. Under these scenarios, the CWB would have been in a net positive position over the five years of the simulation. Indeed, our results show that, generally, the CWB position is positive every year when evaluating only price risk under our base case scenario. This suggests three possibilities, not necessarily independent of each other. First, the PRO may have been somewhat downward biased over this time period. Second, the discount rate, or more specifically the portion of the PRO discounted was too large. Third, five years is a very short time period and the variability of the markets makes it difficult to make any definitive conclusions about the direction of PRO bias or the discount rate to use. However, a Government of Canada bond rate on 20% or 25% of the PRO may be a reasonable starting point when pricing FPC contracts. This assumes that initial payments continue to be set at about 75% of the PRO forecast.

Any FPC or EPCO risk management program implemented by the CWB will not completely remove the risk to the pool account. The results would suggest the following guidelines for the size of a contingency fund assuming 500,000 tonnes are enrolled under the FPC and 500,000 tonnes are enrolled under the EPCO. Thirty million dollars ($30 M) would appear to be of sufficient size to handle possible negative CWB dollar outcomes for at least two years. This assumes that under the historical simulation, the CWB positive cash positions could just as likely have been a negative if other years were available to simulate. However, should the CWB contingency start to approach zero, farm managers may forecast that the CWB will increase the risk discount. This may reduce future farm participation.

Transaction costs and in particular costs of implementing these programs may be substantial. These costs were not evaluated in this study. Unfortunately, there is no way to accurately predict what the farm demand for these products might be. If the demand was small, the program costs per tonne could be relatively large on a per tonne basis. Alternatively, if demand is high, the CWB may have to limit participation to keep CWB risks to a manageable size. The issue of participation is discussed in the earlier study by Unterschultz and Novak (1997).

Conclusion

The study demonstrated a system of managing the risks involved in offering FPC and EPCO. Historical simulations, the methodology used here, does not guarantee that these results will hold in the future. These results should be used as a guideline, however, if the CWB decides to introduce either FPC or EPCO. Clearly, the introduction of an EPCO contract will pose a lower level of risk per tonne to the CWB than offering FPC.

Summary Table

CWB Net Positions on CWRS Wheat under FPC and EPCO from 1993/94 to 1997/98

Positions	Contracts	Revenue – Risk Impact on CWB per tonne of Wheat		Revenue – Risk Impact on CWB per 100,000 tonnes of Wheat	
		Maximum	Minimum	Maximum	Minimum
Cash Position (No Risk Management Activities)	FPC	+$72	-$52	+$7.2M	-$5.2M
	EPCO	+$16	-$0.5	+$1.6M	-$0.05M
CWB Net Position including Wheat and Currency Futures Risk Management	FPC	+$26	-$3.5	+$2.6M	-$0.35M
	EPCO	+$12.8	-$1.5	+$1.28M	-$0.15M

Note: This table is based on Table 10 in the text.

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1 Introduction

The Canadian Wheat Board (CWB) has a mandate to serve farm managers in Western Canada by marketing their wheat, durum and barley for export and for domestic human consumption. Currently, under the CWB Act, the CWB operates a pooling system whereby producers deliver grain during the crop year and receive the average price for the quality of grain delivered over the crop year. Upon delivery, the farmer receives an initial payment less deductions for freight and elevation. The Federal government guarantees the initial payment. As grain sales are completed during the crop year, and as the supply/demand and forward price outlook become more certain, upward adjustments can be made to the initial payment. The CWB completes all sales, pays all expenses, and distributes the funds remaining in the pool accounts to farmers as a final payment in January following the end of the crop year. As the final payment becomes more certain, interim payments to producers may be made prior to the final payment.

This system of pooling and payments ensures that each farmer receives the same price for grain of the same quality delivered during the crop year. Hence, it provides assurance that producers will not be disadvantaged due to timing of delivery throughout the crop year. This feature is important considering that producers do not have full control over the timing of delivery. The price pooling system, however, does not recognize the diverse producer needs in terms of risk management and cash flow requirements. The time lag in receiving the final price on delivered grain is identified as a cash flow problem for the farm manager. Additionally, no mechanism is in place to allow managers to lock in a price for grain delivered earlier in the crop year. Despite the initial payment, the farm manager confronts price uncertainty. The final value of the crop delivered to the CWB is not fully determined until after the crop year is over. Moreover, the price uncertainty is larger at seeding time and during the early part of the crop year when information on world production is less available than later in the crop year.

The federal government commissioned a panel in October 1994 to examine Western Canada's grain marketing system in response to the request of farmers to make the system more flexible and responsive. The recommendations of the Western Grain Marketing Panel are embodied in the amendments to the CWB Act, Bill C-4. This Bill allows pricing alternatives designed to address the diverse cash flow and price risk concerns of farmers. Offering these alternatives to producers,

however, exposes the CWB to new risks. Some of these risks are price risks, exchange rate or currency risks, quantity risks, grade spread risks, and counter party risks.

Previous studies have investigated the theoretical aspects of these risks as well as potential ways to manage and quantify them (Unterschultz & Novak, 1997; Simonot et al. 1997). However, none has actually described, in detail, how to price these alternatives and evaluate ways of managing these risks. This study describes and evaluates the risks involved in offering these price alternatives. A key constraint imposed in this study is that the general pool must be insulated from these contracts.

These alternatives, called Flexible Pricing and Payment Alternatives (FPPA) in this study, would allow increased flexibility for participating farm managers. Farm managers could manage cash flows and price risk using different alternatives. Two types of FPPA - the Fixed Price Contract (FPC) and the Early Pool Cash Out (EPCO) - are evaluated here. There is a third alternative, the Negotiable Producer Certificate (NPC). There are no hedging strategies involved for the CWB in offering NPC. Hence, the NPC is not evaluated in this study.

The FPC is equivalent to a forward contract[1]. This contract would enable a farm manager (farmer) to lock in a fixed cash price prior to the commencement of the crop year. The grain covered would not participate in any further pool account payments from the viewpoint of the farm manager. To maintain pool integrity, the physical grain would still be part of the CWB pool from the CWB's viewpoint and would be included in the calculations of the pool pay out. Simply stated, farm managers could lock in the forecast pool price prior to, or during, seeding. When the grain is delivered, the farmer is paid this fixed price[2]. The farm manager gives up all opportunities for an increase or decrease in the pool value due to changing market prices. Hence he/she receives neither adjustment, interim nor final payments. The CWB assumes the risk associated with any future changes in pool values. Hence, the need to evaluate risk management alternatives from the CWB's perspective.

[1] A forward contract is a contract or agreement made between a buyer and a seller of a cash commodity in the present for future delivery of the product.
[2] At the time the FPC contract is signed, the quality of grain to be delivered is unknown. The FPC contract specifies the contract prices for the different qualities of grain that the farm manager will deliver.

The EPCO would enable participating farmers to receive their initial payments when they deliver their grain and then a fixed final payment, prior to the end of the crop year. They would not participate in any additional final payments. This pay out could occur at any time during the crop year or at the end of the crop year. Again the CWB would assume the risk associated with any future changes in the pool account value.

In addition to describing and evaluating the CWB risks involved in providing the FPC and the EPCO to farmers, this research measures the effectiveness of using public risk markets such as the Minneapolis Grains Exchange (MGE), Chicago Board of Trade (CBOT), and Kansas City Board (KCBT), to manage the CWB price risks. The residual CWB price risks, after controlling for risks involved in offering the contracts, will be identified and evaluated. Finally, grade risks will be estimated and sensitivity analyses on the results performed.

The methodology employs an historical simulation approach. Historical simulations have been used to test models prior to their application. They are able to reveal, in most cases, the strengths and weaknesses of models, thereby allowing adjustments to be made to them prior to their implementation. The methodology evaluates price risks associated with the pricing alternatives using historical data for the years 1993 to 1998 by assuming these alternatives were available in those years.

The methodology uses the Pool Return Outlooks (PRO), a CWB forecast of pool prices, to estimate the FPC and the EPCO prices. The FPC and EPCO price estimates are then subtracted from the Final Pool price (i.e., the sum of the initial, adjustment, interim, and final payments) to obtain the net CWB cash positions. These values are what the CWB would have gained or lost over the crop year in offering the two programs without any hedging programs to manage risk. This is called the cash position in this study. It is assumed that the CWB uses wheat futures contracts on the Minneapolis Grains Exchange (MGE), the Chicago Board of Trade (CBOT), and the Kansas City Board of Trade (KCBT) to protect itself from risks associated with these alternatives. Futures contract prices trading on these exchanges are denominated in US dollars. However, the CWB pays farmers in Canadian dollars. Hence, there are currency (exchange rate) risks involved in using these exchanges. These risks are managed by using the International Monetary Market (IMM) on the

Chicago Mercantile Exchange (CME). The cash positions are then compared with the net wheat hedge and currency hedge positions to arrive at what the CWB gain/loss positions would have been had these two contracts been offered in 1993/94 through 1997/98 crop years. Since the final grade price spread may differ from the price spreads stipulated in the FPC and EPCO contracts, the contracts will contain grade risks for the CWB. These risks are also analyzed in the study. Transaction costs and default risk are not included in the analysis.

The next chapter reviews the issue of pooling and briefly discusses the PRO, the FPC and the EPCO. It is followed by a detailed description of the methodology used in the study. The final sections are the results, discussions and conclusions.

2 Background

This chapter provides a brief description of the pooling mechanism, the PRO, the FPC and the EPCO. The pooling arrangements determine the design of the hedging program. A description of the pooling mechanism is necessary to understand the price risk that the hedging technique is designed to manage. The PRO is the price forecast that is used to set the FPC and the EPCO contract prices. The FPC is the contract that enables the farmer to lock in a price prior to seeding and the EPCO is the contract that the farmer can sign, after making a delivery, to receive a price in lieu of the final price.

2.1 Brief description of Pooling

All wheat delivered to the CWB, with the exception of durum, are put into a single wheat pool account. As the different classes/grades/protein levels of wheat are sold, the proceeds are deposited into the single pool. A series of quality grade/protein level price differentials are tracked over the course of the year and used to calculate the relative average sales return within each pool for each grade/protein level. Upon delivery to the CWB at primary elevators, farm managers receive an initial payment. As pool revenues become less uncertain, upward adjustments may be made to this initial payment. A final payment is made when all final sales from the pooled grain are made. The pool is finalized when all grain delivered during the crop year is sold. This final pool value, less CWB marketing costs, determines the total pay out to the farmer. If the average sales revenue (for the CWB) is below the previous payments to producers, the account is in deficit and, historically, the Federal Government covers the difference.

By participating in the pool, farm managers share the risk of price fluctuations related to the timing of sales among themselves. The market timing and pricing role is transferred to the pool manager. Implicitly, some basis risk is also being averaged through this pooling arrangement since the cash price always reflects the net cash less the relevant basis. In addition, price fluctuations related to the class/grade/protein level (a part of basis) over time are averaged.

2.2 The Pool Return Outlook

Prior to the beginning of each crop year, the CWB sets tentative payment forecasts for different grades of wheat, based on their ‘outlook’ of the crop year. These payment forecasts are called the

Pool Return Outlook (PRO) and are issued starting either in February or early March (see Table 1). The PRO is revised each month, as more information becomes available until about February of the following year. In March of the following year, a new set of projected pool payments are announced. These are called the Expected Pool Returns (EPR). These are revised quarterly, thereafter, until the pool is closed.

The PRO is the best source for a price forecast on the wheat pool account. Its calculation is based on a complex weighting procedure whereby the expected sales volume by grade/protein level and buyer/country is multiplied by the expected prices, less the CWB operating costs (Unterschultz and Novak, 1997). Prices are based on an amalgam of relevant futures prices and the CWB market analysis along with the expected CWB sales program by country or region. This market analysis consists of detailed demand and supply analyses. As sales occur, projected sales volumes and sales prices are replaced by actual sales volumes and sales prices. This reduces the pool returns uncertainty over time. Since the values of the FPC and the EPCO in this study are based on the PRO, for farm managers to accept and embrace these contracts, it is essential that the PRO is an unbiased forecast[3] and perceived by farm managers as such.

2.3 The Fixed Price Contract

The Fixed Price Contract (FPC) is one FPPA that is allowed by the legislative amendments to the CWB Act in 1998. These contracts would potentially be offered in March, April, May and June prior to the beginning of the crop year (see Fig. 1). They are signed prior to seeding and would enable farmers to lock in a fixed cash price on the pool. Farmers who sign these contracts receive a fixed price upon delivery. They would not participate in the wheat pool. However, grains delivered under these contracts are accounted for as part of the wheat pool. Given that the time period in which these contracts are signed is during, or prior to, the period of seeding, there are risks involved for the CWB in offering the contracts. For example, at this time, much information about the cropping situation of producers in both Northern and Southern Hemisphere would not be known.

The FPC is equivalent to a forward contract on the pool. Prior to offering this contract to farmers,

[3] This simple means that on average, the PRO (and the EPR) and the final realized pool price are equal.

the CWB must calculate the contract price. The value (or price) of the FPC could be obtained by discounting a portion of the PRO and adding the result to the undiscounted portion. This value is the contract price paid by the CWB at the time of wheat delivery. By paying farmers this value, the CWB is exposing itself to price risk on the pool since very little of the grain in the pool is priced. The CWB could protect itself by hedging the price risk over the period of the actual sales. Hence, to hedge the price risk, the CWB should lock in the FPC contract price on the forecast pool average using derivatives markets such as futures markets. This technique is referred to in this report as average (pool) price hedging. Ideally, the value of the hedge, less the transaction costs, should leave the CWB in a neutral cash position. The specifics are discussed in Section 3.

2.4 Early Pool Cash Out

The Early Pool Cash Out (EPCO) is the other FPPA considered in this study. This contract offers farmers the opportunity, after receiving the initial payment, to "cash out" their equity in the pool account prior to the determination of the final payment. They no longer receive any final payment. However, since the final pool pay out is not usually made until the following January, there is still some element of price risk for the CWB. This risk should be less than the risk entailed in offering the FPC.

The value (or price) of the EPCO could also be based on the most current PRO or Estimated Pool Return (EPR) less a discount factor for interest, administration and risk management costs. For example, a farmer has delivered 100 tonnes of wheat and receives an initial payment of $100 per tonne. In December, thirteen months before the final payment, the CWB is projecting a final pool return of $175 per tonne (the PRO). The farmer could then sign an EPCO contract with the CWB for a value less than the remaining $75 ($175 minus $100) per tonne. The difference between the EPCO value and the $75 represents the discount factor for interest, administration and risk management costs.

The EPCO can be offered either at the end of the crop year, when all quantities and grades in the pool are finalized, or at anytime during the crop year. In this analysis, it is assumed that the EPCO is offered anytime between August and the end of the crop year, i.e., July of the following year. However, to simplify the historical simulation estimation, only 4 months (September, December,

March and June) were picked as the months during which the EPCO is offered.

2.5 Cash Position

The CWB's cash position is their net dollar position associated with FPC and EPCO contracts at the end of the crop year. It is their net position without hedging activities. A positive cash position implies the CWB paid out less under the FPC and EPCO than the CWB received in sales revenue. A negative cash position indicates the CWB paid out more to the FPC and EPCO programs than they received in revenue. Specifically, the CWB cash position for the FPC and the EPCO are given by the differences between the Final Pool value and the respective FPC and EPCO contract prices. Alternatively, it is the CWB's position that would result from signing contracts without protecting itself from the risks involved. For example, assume a total of 100 tonnes of wheat were priced under the FPC program. If the FPC price was set at $136.23 per tonne and the final pool price was $164.01 per tonne (Table 1), the CWB net cash position on the FPC contract is $27.78 per tonne, or $2778 per 100 tonnes. Actual total wheat pool values are reported in Table 1. The other values in the Table are explained below. The objective of CWB risk management program is to move the CWB net position as close to $0 as possible.

The cash positions will be influenced by the methodology used to calculate both FPC and EPCO prices. If the calculations produce lower FPC and EPCO prices than the final payment, then the cash positions will be positive. Should this happen continuously, farmers will become disinterested in the contracts. Alternatively, if FPC and EPCO prices usually exceed the final payments, then the CWB will experience continuously negative cash positions. The CWB will be unable to continue with the program. The valuations of the FPC and EPCO contracts are critical and are described in Sections 3.1.3 and 3.1.5 respectively.

3 Historical Simulation Methodology

Historical simulations are used to test theoretical models before application. They provide information on what would have occurred in the past but do not predict the future. Historical simulations use historical data to reconstruct what would have occurred in the past. The variables are then changed under 'what if' situations to see their effects on the final results. This exercise applied in this study will reveal information about the viability and risks of new policies.

The historical simulations used publicly available data on the PRO, the EPR, wheat futures and currency futures between 1993 and 1998 to reconstruct the risks involved in offering the FPC and the EPCO to wheat farmers. The simulation process then hedges these price risks such that at the end of the crop year the CWB ideally is in a neutral position. In what follows, the process of hedging the average price of the pool is described, followed by the detailed descriptions of how to calculate the cash position, the FPC and the EPCO prices.

3.1 Hedging the Average Pool Price - Methodology

When producers sign FPC and EPCO contracts with the CWB, they lock in a fixed price and eliminate their payment uncertainty. The CWB accepts the price risk on the pool value and needs to manage this risk exposure. The hedging strategy discussed here is based on #1CWRS grade of wheat. However, since grades other than #1CRWS will be delivered, there are grade spread risks involved for the CWB. This issue is discussed in Section 3.4.

As mentioned earlier, the price that should be hedged here is the pool price, which is an average price over the crop year. Hedging individual prices is different from hedging an average pool price over a crop year. Assume a farmer signs a FPC with the CWB to deliver 1 tonne of wheat after August 1 when physical deliveries on FPC contracts may begin (see Fig.1 and Table A1 in the Appendix). Even though the farmer has not delivered the wheat, the CWB is committed to the stipulated price in the FPC and any stipulated grade discounts. Hence, there is the need for risk management. Wheat contracted under a FPC will still form part of the pool upon which the final price is calculated. The type of risk management that is appropriate in this situation is hedging the average price. The goal of this hedge program is to lock in a price on the portion of the pool that is

contracted under the FPPA. Thus, hedging ideally should use a derivative contract on different contract months to match the expected sales program. This is explained by first describing the general timeline for a typical crop season.

3.1.1 Historical Simulation Assumptions

Assumptions used in the historical simulation are described in this section. For the sake of this study, it is assumed that hedging transaction costs are zero. The general timeline (see Fig. 1 in Appendix 2) begins with the announcement of the PRO on the first day of March before spring seeding[4]. After this announcement, the CWB begins to sign Fixed Price Contracts (FPC) with farmers.

The timeline includes the following assumptions[5]:

- First PRO estimate for next crop year announced in March;
- FPC is signed between March 1 and June 30 prior to the beginning of the crop year;
- First sale of new crop is made by CWB around the 30th of June;
- No FPC contracts are signed after July 1;
- Initial Price announced for all grades of wheat just before August 1;
- Crop year begins on August 1, and ends on the 31st of July of the following year;
- Deliveries on FPC are made between August 1 and July 31 of the following year,;
- EPCO contracts are signed between August 1 and July 31 of the following year;
- First EPR announced in March of the following year, others follow in June and September;
- Last CWB sale of wheat in the Pool occurs in October of the following year; and
- Final Pool Payment for the Crop Year occurs in January of the second year.

It is assumed that the FPC is signed once a month - on the second Wednesday in March, April, May and June. It is also assumed that the EPCO is signed once a month, on the second Wednesday in September, December, March and June. A detailed explanation about the trading months for the

[4] In fact, the PRO is usually announced in February. We however assume March 11 as the announcement date.
[5] The dates for some of these events vary from year to year. For the sake of this study, dates for some events have been fixed around historical CWB dates.

EPCO is given later.

Futures contracts trading on the Minneapolis Grains Exchange (MGE), the Kansas City Board of Trade (KCBT) and the Chicago Board of Trade (CBOT) are used to hedge the CWB wheat price risk. The MGE is the least liquid of the three wheat futures exchanges, i.e., *inter alia*, contracts entered into on this exchange are not as easily offset as on the other two exchanges because trading is not as heavy on this exchange as on the other exchanges. The MGE, however, trades in wheat that most closely matches the grades under consideration for the contracts (i.e., CWRS). For each tonne of wheat contracted by the CWB, hedging activities will be split among the exchanges in the following fashion: 20% will be on the CBOT, 40% will be on the KCBT and 40% will be on the MGE (see Table 3). This trading distribution represents the base case. Other hedging scenarios used in simulation analyses are described later. Currency risk is hedged through the International Money Market (IMM) in Chicago.

Although there are other derivative contracts, futures contracts are the best source of information for this simulation. Forward contracts may not be easily available. Options[6] contracts available on public exchanges are not as liquid as futures contracts and they require the payment of option premiums.

On the day that the contracts are signed, it is assumed that hedges are placed by the CWB to manage the risks involved in signing the contracts. The CWB sells wheat futures to reduce the risk of a price drop. It buys Canadian dollars on the IMM to reduce the risk of the Canadian dollar increasing in value relative to the US dollar. The simulation assumes that all futures contracts positions are closed (offset) prior to the delivery month. Also, it assumes that hedges are either lifted once a month, i.e., on the last Wednesday of the month, or weekly. In the weekly case, the contract is divided equally among the number of Wednesdays in the month and offset every Wednesday in the month. The exchange rate futures are placed and lifted in conjunction with the wheat contracts for all the scenarios.

[6] An options contract gives its owner the right (without being obliged) to buy or sell an underlying asset for a certain price for a limited period of time.

3.1.2 Risk Management Operations: Using Wheat Futures for Fixed Price Contracts

A wheat futures hedging program is simulated to measure how much CWB risk is removed through the use of wheat futures. When a FPC is signed, the price is set on the tonnage specified. Since the FPC price is based on the expected pool value, the CWB's risk management objective is to lock in a price on the equivalent tonnage in the pool equal to the FPC price. A detailed example for managing FPC risk is presented next.

Assume that the CWB enters into a FPC with a farmer on the 11th of March 1998[7] for 1 tonne of #1 CWRS to be delivered in October 1998 (Fig.1 in the Appendix)[8]. The CWB assumes the price risk since none of the next crop year's grain has been priced. Seeding in Western Canada has not commenced. Information about the cropping situation of other major world suppliers and importers is not known at this point in time. The demand and supply picture of wheat is unclear. The final pool price is uncertain. The CWB, therefore, needs to protect itself from losing money on this contract with the farmer. (Table A1 in Appendix 1 shows a detailed description of the hedging program for the FPC.)

The 1998/99 wheat pool account in January 2000 will be the average price for each grade in the pool over the crop year. The hedging strategy must aim at maintaining this final average price. The hedging strategy should be such that, ideally, the final (average) return for the FPC results in neither profits nor losses for the CWB. Secondly, at the time the FPC is signed, none of the pool wheat is priced. Hence, the whole pool period must be hedged. Assumptions about the distribution of sales throughout the pricing period are required to determine the weighting of futures contracts on each expiry month. The simulation requires the anticipated distribution of wheat sales for the hedging strategy. The actual distribution of sales is unknown to the authors. Table 2, the base case, is used as the anticipated timing of wheat sales by the CWB. It shows, for example, that 3% of the total pool sales occur in June prior to the crop year opening, 1% in July, 6% in August, 8% in September, 14% in October, and so on. Thus for each tonne contracted, 3% is hedged for pricing in

[7] Assume the program begins in 1998.
[8] The delivery period is specified by the CWB in the FPC. Delivery of any grade other than #1 CWRS would be priced

June, 1% for pricing in July, 6% for pricing in August, and so on. This distribution of sales is used as one of the scenarios. An alternative scenario is equally distributed sales from June to October of the following year (17 months). Hence, under this scenario, 5.88% (1/17) of the pool is projected to be priced by June 1998, 11.76% (5.88 x 2) by July 1998, etc. This second scenario is used in explaining the procedure below.

Basically, wheat futures contracts are sold on the day the FPC contracts are signed. There are March, May, July, September and December wheat futures contracts available on these Exchanges. The trades are made in US dollars (USD). However, the CWB needs Canadian dollars (CAD) to pay farmers. Hence, there are currency risks involved. To cover the currency exposure, exchange rate futures are also bought to protect the value of the wheat futures contracts sold. Both the wheat and exchange rate futures are concurrently offset, again under various scenarios, in the month prior to the contract expiration month. The value of the hedges are then translated into CAD using the spot USD/CAD exchange rate of the day the contracts are offset. This process is followed throughout the hedging period. An example will be appropriate.

On March 11th 1998, when the FPC contract is signed for 1 tonne of wheat, a short position of 0.059 (5.88% of projected sales in June) tonne is taken with July 1998 futures contracts trading on the 3 Exchanges to cover the June projected sales. The distribution of trading among the Exchanges shown in Table 3 is used for this analysis. Thus if 40% of the trading is done on Kansas, 40% on Minneapolis and 20% on Chicago, then 0.0236 tonne will be short (sold) on Kansas, 0.0236 tonne on Minneapolis and 0.0118 on Chicago. In addition, all projected monthly sales throughout the crop season should be such that the contracted 1 tonne is covered. Thus, on the day the contract is signed for 1 tonne, the CWB takes all of the following actions on the three Exchanges:

- short 0.117647 (0.058823 per month x 2 months) tonne using the September 1998 futures contract to cover the expected sales in July and August 1998;
- short 0.17647 (0.058823 per month x 3 months) tonne using December 1998 futures contracts to cover expected sales in September, October and November 1998;
- short 0.17647 tonne using March 1999 futures contracts to cover expected sales in December 1998, January and February 1999;

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according to a schedule of premiums and discounts for grade and protein.

- short 0.117647 tonne with the May 1999 futures contracts to cover expected sales in March and April 1999;
- short 0.117647 tonne with the July 1999 futures contracts to cover expected sales in May and June 1999;
- short 0.117647 tonne with the September 1999 futures contracts to cover expected sales in July and August 1999;
- short 0.117647 tonne with the December 1999 futures contracts to cover expected sales in September and October 1999.

These activities occur on the day that the contract is signed, i.e., the 11th of March 1998. The value of the contracts will be for one FPC contract signed on that second Wednesday in March. This analysis assumes that on the 11th of March 1998, there will be contracts trading on all 3 Exchanges up to December 1999. The situation where this is not possible is illustrated in section 3.1.2.1 below.

The CWB makes its first grain sales in June and therefore 5.88% of the total wheat pool no longer needs price risk coverage. In June, the first unwinding of the futures contracts takes place. The CWB unwinds the July futures contract of 0.059 tonne off the 3 Exchanges by buying back the wheat futures contracts that were sold. At the same time, the currency hedge is lifted and the total value of the hedge estimated (see Equations 1 and 2 in Appendix 3). The CWB would, in practice, monitor this daily.

In July, the CWB unwinds half of the September futures contract position (September contracts were used to hedge July and August projected sales) by buying back September futures on the 3 Exchanges as described above. The other half of the September wheat futures position is offset in August. The same procedure is used to offset the remaining contracts throughout the sales period.

For each year, FPC contracts are signed in 4 months - March, April, May and June. The risk management program described above is repeated for each of these months, using the appropriate wheat futures contracts to hedge the projected sales. The long (buy) position futures prices are subtracted from the short (sell) position futures prices to determine hedge profits or losses. The result is multiplied by both the percentage of trading carried on through the exchanges and the

projected sales made in the trading month to obtain the profit/loss position (value) of the wheat hedge in US dollars (see equation 1 in Appendix 3).

When each futures contract position is closed, the spot exchange rate on the date of offsetting is used to translate the hedge profits or losses into Canadian dollars (CAD) from US dollars (USD). Finally, since there are 4 months in which FPC contracts can be signed in a year, the average net hedge profits/losses for each contract is obtained by summing the results obtained above from the 4 sets of FPC contracts, and dividing by 4 (see Equation 1 in Appendix 3). This procedure assumes an equal weighting of contracts signed by farm managers within the 4 months. Sensitivity analyses discussed below will alter these weights and examine how sensitive the results are to the timing of manager sign-up.

3.1.2.1 Sequential Rollover of Wheat Futures

In certain cases, futures contracts may not be available at the time FPC contracts are signed. In such cases, a sequential rollover hedging technique is simulated. For example, assume that at the time of signing the FPC contract in March 1998, there are no May 1999 contracts to cover March and April 1999 pool sales. This situation is common with futures markets that are not very liquid in distant futures months. Here is how the simulated rollover technique would work. In this case, 0.117647 (0.058823 x 2) tonne will be added on to the available March 1999's contract to cover March and April 1999 sales. In February 1999, 0.17647 tonne (0.058823 representing the portion covering February plus the 0.117647 representing March and April) is bought back and 0.117647 tonne, representing the projected sales for March and April, is sold using May 1999 futures which should by then be available (in February 1999). Then at the end of March, 0.117647 is bought back and 0.058823 tonne is sold to cover April. At the end of April, 0.058823 tonne is delivered and the contract worth 0.058823 is offset. Alternatively, if the May 1999 contract is available in December 1998, it can be used to hedge March and April 1999 projected sales with the offsetting taking place in February and March similar to the procedure described earlier. The problem with the sequential rollover technique is that there may be liquidity problems on some of the exchanges for distant futures contract months.

3.1.3 Determining the FPC Contract Price

A critical issue is estimation of the price agreed to in the FPC. The estimation of the FPC price relies on the PRO. The PRO comes as high and low values. To estimate the value of the FPC (and EPCO) contracts in this historical simulation, the means of the PRO values are used (Table 1). To arrive at the FPC value, the PRO values are discounted in two ways. First, 25% of the PRO is discounted to account for the assumption that the Initial Payment is roughly set at 75% of the PRO and the timing of payment may vary in the crop year (Equation 3 in Appendix 3). The period of discounting is from the time the FPC contract is signed to the time the final payment is made. Second, 15% of the PRO is discounted for similar reasons as above (Equation 4 in Appendix 3). The discounted values in the two cases are added to the undiscounted portions (of the PRO) to arrive at the estimated FPC values. The discount rate used is the 2 year Government of Canada bond yield rate since the period between the signing of FPC and the final payment is almost 2 years. The two methods of discounting provide a range of discounts to evaluate CWB risk.

Table 1 shows the average PRO for the months of February, March, April, May and June for the various crop years. Two FPC prices for each month are calculated by using the average PRO and the bond yield rate for the month (Equation 3 and Equation 4 in Appendix 3). The first FPC price, obtained from discounting 25% of the PRO, is called FPC1. The second FPC price, obtained by discounting only 15% of the PRO is called FPC2. Table 1 shows, for example, that for the 1993/94 crop year, the average PRO value in April 1993 (199304) is $140 per tonne. This value is obtained from the low PRO of $135 and the high PRO of $145. The bond yield rate in that month is 6.5% and the average FPC1 (obtained from both the low and high PRO) is $136.18 while the average FPC2 is $137.71. Hence, the forward contract price is either $136.18 per tonne or $137.71 per tonne in this scenario and crop year. The value for FPC2 is greater than that of FPC1 as expected. This shows that the proportion of the PRO that is discounted matters in the determination of the cash position.

3.1.4 Risk Management Operations: Using Wheat Futures for the Early Pool Cash Out Contracts

As described earlier, the Early Pool Cash Out (EPCO) is offered after the beginning of the crop year. It is offered to farmers who have already delivered to the pool account, received the initial payments, and do not wish to wait for their portion of the final payment. Upon signing the EPCO,

the farmer is paid and no longer partakes in any adjustments or final payment. The grade delivered is known. Although there is no risk to the farmer, there will be price and some grade risk to the CWB since grain delivered under EPCO becomes part of the pool. The grade risk arises from the difference between the price spread for the different grades in the EPCO contract and the final pool grade price spread. Also, by the time the EPCO contract is signed, more information is available on prices that were not available when FPC contracts were signed. For example, by September in the crop year, part of the wheat pool is priced. This portion of the wheat pool does not need to be hedged. Thus, only the unpriced portion of the wheat pool needs to be hedged when signing EPCO contracts. For these reasons, the CWB risk from the EPCO will be less than those associated with the FPC.

Since it is assumed that the EPCO can be signed any time during the crop year, i.e., between August 1 and July 31 of the following year, the simulation values should be estimated for each month within this period. However, to simplify the analysis, four months have been selected for illustration of the process. These months are September, December, March and June. Table A2 in the Appendix gives a detailed description of the hedging program for the EPCO.

The risk management process is similar to that of the FPC. Assume an equal distribution of actual sales over the 17 months, i.e., from June to October of the following year. Then by September (three months from June), 17.65% of sales would have been made [5.88235 x (June+July+August)], leaving 82.35% of the pool unpriced. The procedure followed in hedging the average price from the time the contract is signed to the time the final wheat sale is made is similar to that of the FPC described above. However, only 82.35% of each tonne contracted under the program is hedged when September EPCO contracts are signed. The hedging procedure for September is repeated for December, March and June. EPCO hedging programs for these later months would hedge correspondingly a smaller proportion of each tonne contracted. One could use the results obtained for these four months to extrapolate results to other months not covered in the simulation.

3.1.5 Determining the EPCO Contract Price

The calculation of the EPCO price is similar to that of the FPC. The average of the PRO is used

(Table 1). Farmers who sign the EPCO have already received the initial payment plus any adjustment and interim payments as the case might be. What they are getting from the contract is their expected portion of the final payment. To arrive at the value of the EPCO, the difference between the full average PRO and the sum of the initial and adjustment payments are discounted over the period between the signing of the EPCO and the time the final payments are made. The 1-year Government of Canada bond yield is used in the discounting since the period between the signing of the EPCO and the final payment is closer to one year than two years. The sum of the EPCO price, the initial and adjustment payments are subtracted from the final pool price to obtain the net cash position of the CWB. The formula used in calculating the EPCO can be found in the Appendix 3 (Equation 5). The sum of the cash position and the hedge profits/losses give the total gain/loss position of the CWB.

3.1.6 Risk Management Operations: Exchange Rate (Currency)

The CWB can use futures, forward or OTC contracts[9] (or even currency swaps) to hedge exchange rate risks. This simulation uses exchange rate futures contracts because their dates of trading are easy to obtain. The methodology is described next.

Canadian dollars trade on the International Monetary Market (IMM) at the Chicago Mercantile Exchange (CME). The IMM offers contracts that price Canadian dollars in US dollars. The concern of the CWB in this case is to protect against a rising Canadian dollar since the wheat futures contracts are denominated in US dollars. The Canadian dollar increases in value if the IMM quoted price increases, i.e., it takes more US money to buy one Canadian dollar. This decreases the wheat price in Canadian dollars. Thus an appropriate action for the CWB after taking a short position (sell) in the wheat futures contracts is to take a long position (buy) in USD-CAD exchange rate futures on the IMM. These exchange rate contracts are available in March, June, September and December on the IMM. The hedging process follows the one for the wheat contracts described above. To hedge May wheat futures contracts, June exchange rate futures are used. Since May wheat futures contracts are offset in April, this poses no problems. To hedge July wheat contracts, September exchange rate futures are used, etc.

[9] OTC stands for Over The Counter. These are contracts trading off the exchanges.

The value of the exchange rate hedge position can be calculated in a way similar to the calculation of the wheat hedge position. To cover the wheat futures contract, exchange rate futures are bought on the day the FPC or EPCO contract is signed. This rate is used to transfer the value of the wheat futures sold on the 3 exchanges into CAD. It is important to note that what is being hedged is the value of the short position taken in wheat futures. The foreign exchange futures are lifted by selling exchange rate futures at the same time the wheat futures positions are lifted. The value of the exchange rate hedge is therefore obtained by the difference between the long and short futures exchange rates, multiplied by the total dollar value of the short position taken on wheat futures. The result is translated into CAD by using the spot exchange rate trading on the day the offsetting takes place (see Equation 2 in the Appendix).

3.2 Alternative Historical Simulation Scenarios

Sensitivity analyses can be used to evaluate the risks assumed by the CWB in offering the contracts. They provide the CWB an opportunity to study the extent to which the variables used can influence the risk of the contracts. The scenarios suggested here for the FPC and the EPCO are the following:

- changing the weighting of projected CWB sales;
- changing the weighting of trading among the CBOT, KCBT, and MGE;
- changing the frequency of hedge transactions and
- changing the trend of farm participation in the contracts.

These scenarios are necessary to evaluate the sensitivity of our historical simulation results to the timing of sales, the different weighting on the futures markets, etc. For example, the CBOT is the most liquid of the exchanges used. However, the main type of grain that the CWB deals in (CWRS) trades on the MGE. Altering the proportion of trading that is carried on among these exchanges will show the extent to which the CWB can use other exchanges to manage risk. The frequency of trading will enable us to observe whether or not there is any historical difference in hedge values from lifting hedges on weekly basis or on monthly basis. Knowing the trend or the pattern of participation of farmers in the contracts provides information on how delivery patterns change risk. However, the proportion of farmers that will sign the contracts throughout the period the contracts are available is unknown. Does it matter if more farmers sign earlier than later or vice versa? The participation trend scenarios provide information on the extent to which when farmers sign

contracts affect the risk position of the CWB. The CWB can use this information to decide on whether to control the participation of farm managers in the contracts or not.

Two types of weighting for projected sales were used. The first one (base case) has the majority of sales occurring between August and March, with a peak in October (Table 2, Scenarios 1 & 2). Scenarios 3 & 4 have an equal distribution of sales throughout the year. It is assumed that these projected CWB wheat sales are the same throughout the study period, i.e., from 1993/94 to 1997/98 (Table 2). Two sets of weightings for trading a contract on the 3 wheat futures exchanges are used (Table 3). Scenarios 1 & 3 distribute futures trading according to the proportion 20:40:40 for CBOT, KCBT and MGE respectively. Scenarios 2 & 4 distribute futures trading according to the proportion 10:15:75 for CBOT, KCBT and MGE respectively. These weightings are also assumed to be the same throughout the study period. The scenario numbers in Table 2 correspond with those in Table 3. Scenario 1 is considered the default or base case in the simulation. For each of the scenarios, hedges are either lifted or offset monthly or weekly. The results of the scenarios (for the FPC and the EPCO) are each separated into monthly and weekly offsetting cases. The results are discussed in Section 5.

It is not expected that the level of participation will be the same throughout the months that the FPC and the EPCO are available. Three scenarios were therefore simulated for the FPC. The first scenario is what is called equal participation. This is the scenario where the assumption is made that there is equal participation of farmers in the four months that the contracts are available. The second scenario is the increasing level of participation where it is assumed that the proportion of contracts signed rises from 10% in March to 20% in April, 30% in May and 40% in June. The third scenario, the decreasing level of participation scenario, assumes that the degree of participation decreases from 40% in March to 30% in April, 20% in May and 10% in June. Similarly, three scenarios were simulated for the EPCO. These scenarios are equal participation in the four months, increasing level of participation rising from 10% in September to 20% in December, 30% in March and 40% in June, and decreasing level of participation from 40% in September, 30% in December, 20% in March and 10% in June.

For the base case only, one other scenario was simulated for both FPC and EPCO contracts, using a

new proportion of 60:20:20 for trading on the CBOT, KCBT and MGE respectively. This evaluates more extensive use of the more liquid CBOT for risk management. These results are analyzed using the equal farm participation scenarios only so as to be comparable with the base scenario.

3.3 Contingency Fund Estimation

Given the scenarios analyzed, one would want to know how much gain or loss the contracts would be to the CWB. The majority of the analysis is on a per tonne basis. Results are translated into different total dollar amounts based on different tonnage contracted under each program.

3.4 Grade Spread Risks

Prior to the announcement of the PRO, the CWB does not have any knowledge about the quality of wheat that farmers will produce during the crop year. The weather and world markets could profoundly alter the quality of the grains, e.g., the protein content, grade, and the prices for different grades. Hence, the price spread specified in the FPC and EPCO contracts may differ from the final realized price spread in the pool.

Unterschultz and Novak (1997) report the historical quantity and price distributions for #1 CWRS, #2 CWRS and #3 CWRS from the 1975/76 crop year to 1995/96 crop year. These distributions show that between 1975 and 1995, 56.82% of the grains delivered were of grades #1, 24.62% were of grade #2 and 18.56 were of grade #3. The historical mean price spreads between the #1 and #2 and #1 and #3 were about $6 and $14 respectively. The table is reproduced as Table A27 in Appendix 1. The benchmark used is the #1 CWRS, which is used to develop the risk programs.

Assume that each FPC contract specifies a $6 per tonne discount under #1 for #2 or a $14 discount under #1 for #3. The spread risk is calculated by taking the difference between the final pool price spreads between #1 and the grade for the crop years under study, i.e., 1993/94 to 1997/98, and the historical price spread between the #1 and the grade. The result is then multiplied by the ratio of the historical quantity of the grade to the total historical average (see Equation 6 in Appendix 3). For example, the historical price spread between #1 and #2 is $6. The final pool price in 1993/94 for #1 and #2 are $164.01 and $155.46 respectively. Hence, the final pool price spread between #1 and #2 is $8.55. The difference between the two price spreads, $-2.55, is multiplied by the historical

proportion of #2 to the total historical average, which is 0.246 to arrive at the grade spread risk for 1993/94 crop year between #1 and #2 of $-0.627 per tonne. The grade spread risk can not be eliminated by the hedging program. The results are found in Table 11.

4 Sources of Data

The PRO and final payment data were obtained from CWB. The data for the wheat and foreign Exchange Futures contracts were obtained from Bridge Information Systems America, Inc. and the 1-year and 2-year bond rates for appropriate years were obtained from Bank of Canada publications.

5 Results and Discussions

The simulation results for the 1993/94 to 1997/98 crop years are reported and discussed in this chapter. The results from the FPC simulation scenarios are reported and discussed first. This is followed by a discussion on the EPCO simulation. The results of the contingency fund requirements are then reported and discussed, followed by an analysis of grade spread risk.

5.1 The FPC

The objective of the hedging process is to counterbalance the outcome of the cash position resulting from offering the FPPA, in this case the FPC. Ideally, the difference between the final payments and the FPC values (cash position) should be offset by hedge outcomes.

Table 4 shows the difference between the net positions, i.e., the combined cash and hedge outcomes, obtained from discounting either 25% or 15% of the PRO. This table is built from Tables A3, A4, A5 and A6 in Appendix 1 and reports the per tonne gain or loss to the CWB, assuming equal participation of farm managers in the contract months. (Table A3 in Appendix 1 explains in detail how to read these tables.) Four scenarios, made up of two projected distributions of monthly sales and two distributions of trading among the exchanges, are presented (see Tables 2 and 3). The net positions, either positive or negative, calculated from FPC2 are lower than those calculated from FPC1 as expected (Table 4). The results in Table 4 also show that if hedges are lifted monthly, the net hedge and cash positions from using FPC1 for all four scenarios would vary from a loss of -$11.00 per tonne to a gain of $25.79 per tonne – a range of $36.90. Similar results from using FPC2 vary from a loss of -$12.22 per tonne per year to a gain of $24.43 per tonne per year – a range of $36.79. Similarly, using FPC1 and lifting hedges weekly, the net position would vary from a loss of -$9.06 per tonne to a gain of $28.97 per tonne, a range of $38.03, compared to a range of $37.85 if FPC2 were used. The proportion of the PRO that is discounted in arriving at the FPC can therefore affect the effectiveness of the hedging program.

Table 4 also has the hedge results for the other scenarios. For example, recall that Scenario 1 is a combination of unequal sales distribution and 20:40:40 trading on the CBOT, KCBT and MGE respectively. From Table 4, the net cash position (from FPC1) for this Scenario for the 1993/94 crop year shows a loss of $3.54 per tonne, if hedges are lifted monthly, and a loss of $2.67 if they

are lifted weekly. Thus, using the FPC1 approach, the CWB would lose $3.54 per tonne if hedges were lifted monthly, or $2.67 per tonne if hedges were lifted weekly. On the other hand, using the FPC2 approach, the net positions from monthly and weekly hedge lifting shows losses of $4.90 and $4.03 per tonne respectively. The interpretations of the results for the other crop years are similar to the one above.

The difference between Scenario 1 and Scenario 2 is the distribution of futures trading among the exchanges. The results from these Scenarios, in Table 4, show that the percentage of trading on the exchanges matter. However, the results are not consistent over the crop years. For example, using FPC1, the net position of Scenario 1 (-$3.54 per tonne) in the 1993/94 crop year for the monthly offsetting scenario is larger (i.e., a smaller loss) than that of Scenario 2 (-$7.60 per tonne). On the other hand, the gain for Scenario 1 in the 1994/95 crop year is less than that of Scenario 2 and the gain for Scenario 2 is less than that of Scenario 1 for the 1996/97 and 1997/98 crop years. The results for the weekly offsetting scenario are also inconsistent .

Scenario 1 and Scenario 3 have the same weighting among the futures markets and different projected distribution of sales. Similarly, Scenario 2 and Scenario 4 also have the same weighting among the futures markets and different projected distribution of sales. Hence, the differences in the results of Scenarios 1 and 3 on the one hand and Scenarios 2 and 4 on the other show the differences between the 2 projected distributions of sales. (see Table 4 for definitions). The results from both sets of Scenarios show differences in net cash and hedge positions. These results are also not consistent. Overall, however, the net (absolute) results from the weekly offsetting transactions are larger than those from the monthly offsetting transactions. Therefore the frequency of trading matters and close monitoring of hedges is required. The matching of predicted sales to actual sales matters for the hedging program to be effective. The weighting of CWB sales, the exact weighting of which is unknown to the authors, as well as the weighting between markets will most certainly be significant factors. It is important to note that the futures prices on the 3 exchanges are not linearly related, i.e., they do not move up and down by the same margin. Moreover, price movements during the month of offsetting can produce simulation results from the weekly offsetting cases that are different from the monthly offsetting cases. This is because only the last Wednesday's price is used in the monthly case but all Wednesdays' prices in the offsetting month

are involved in the weekly offsetting case. This may be an explanation for the difference in the trend between the Scenarios 1 and 2 monthly offsetting and weekly offsetting cases for the 1996/97 crop year for FPC1 and FPC2.

5.1.1 Participation

Table 5 shows the results of three farm manager participation scenarios. The base case assumes an equal level of participation in the contracts in the months they are offered. The increasing level of participation assumes that more farmers sign the FPC with time and the decreasing level of participation assumes that the proportion of farmers signing the contract decreases over time. Table 5 is built from Tables A3-A14, all of which can be found in Appendix 1. The estimates found in Table 5 are based on FPC1, which is the FPC calculation that discounts only 25% of the PRO to estimate the contract price. These are measures of CWB sensitivity to different levels and patterns of farm participation in FPC.

Comparing the three scenarios, the increasing level of participation should have the minimum net position value because a large proportion of the trading is undertaken closer to the end of the crop year and the risk elements of the contract are less than before. However, recall that the FPC simulation has all contracts signed before the beginning of the crop year. The decreasing trend of participation should therefore have the widest range of outcomes. The equal participation scenario should lie in between the two. The results show that the 1995/96 and 1997/98 results are the only ones that show this trend for all four sales and trading distribution scenarios, both for the monthly and weekly offsetting cases. The results for the other years are mixed. For example, the weekly offsetting results for the 1993/94 crop year reverses the expected trend.

Results from Table 5 also show negative net positions for the 1993/94 crop year for all the participation scenarios, whether transactions were offset monthly or weekly. The loss would be greatest for the CWB if farmers' participation in the FPC program decreases from March to June. The results for the equal and increasing participation level scenarios are mixed. For example, the losses generated by the monthly offsetting, equal participation scenario under Scenarios 1, 2 and 4 are smaller than those generated by the increasing participation scenario. However, the loss generated by the equal participation scenario under Scenarios 3 is larger than that generated by the

increasing participation scenario. The results for the weekly offsetting, equal participation case are larger than those generated by the weekly offsetting, increasing participation case under all the four Scenarios. This may be the result of the Wednesdays prices used in the weekly offsetting scenario. Again, from Table 5, the results for the 1993/94 crop year show that the loss from the equal distribution of sales scenario, combined with 10:15:75 trading on the CBOT, KCBT and MGE respectively (Scenario 4), will generate the greatest loss of $12.74 and $9.60 per tonne on the monthly and weekly offsetting cases respectively (i.e., for the decreasing participation scenario). This is contrary to what is expected. The 1994/95 results actually have the reverse of what is expected, i.e., the decreasing participation scenario actually has the least net position for all three participation scenarios.

Comparing the weekly offsetting scenario with the monthly offsetting scenario, one can conclude that frequent monitoring is important. The CWB losses from the weekly offsetting scenarios are less than losses from the monthly offsetting scenarios. The exception to this trend is the results from the 1997/98 crop year. Hence, if transaction costs are minimal, the CWB would be better off if hedges are offset weekly.

A general conclusion from the results from the various scenarios is that weighting of sales over the trading months in the crop year matters. Secondly, the distribution of trading among the exchanges also matters. The difference, however, varies from year to year. This is a source of CWB risk. In addition, the level of participation from farmers matters. However, this factor may be outside the control of the CWB depending on how the contracts are structured. Finally, the procedure used in estimating the FPC matters a great deal to the net cash plus hedge position. Specifically, the discounting of the PRO will influence the net cash position, hence the net cash plus hedge position. The type of PRO discounting depends explicitly on how the PRO is calculated.

5.1.2 Trading Pattern

The results from increasing the level of trading that takes place on CBOT, vis-à-vis the other two Exchanges, can be found in Table 6[10]. This evaluates the situation where the CWB uses a higher

[10] These results will compare directly with those of Table A3 in the Appendix 1. Table A3 in Appendix 1 contains a detailed explanation on how to read this type of table.

proportion of the more liquid CBOT contracts to manage commodity price risk. This scenario was constructed with the base scenario only where the unequal distribution of sales scenario is combined with 60% trading on CBOT, 20% on KCBT and 20% on MGE. The results reflect, in most part, the proportional increases in trading. The results show that with 60:20:20 trading on the CBOT, KCBT and MGE respectively (hereafter referred to as the 60:20:20 trading), both the wheat and currency hedge positions are closer to zero than the original 20:40:40 trading on the CBOT, KCBT and MGE respectively. The exceptions are the 1994/95 weekly net currency hedge position and the 1997/98 monthly and weekly wheat hedge positions. On the whole, the net position for the CWB is greater if the trading on the CBOT is increased to 60%, with the exception of 1996/97 crop year where the results are lower. Increasing the proportion of futures trades conducted on the CBOT may reduce the risk program's effectiveness.

5.2 The EPCO

The results for the EPCO simulation are found in Table 7. This table was constructed from Tables A15-A18 in Appendix 1 and shows the results for the equal, increasing and decreasing participation scenarios. The results of the equal participation scenario show that the monthly and weekly net positions under all the scenarios for the 1993/94 crop year, the 1995/96 crop year, the 1997/98 crop year as well as the weekly offsetting results for the 1994/95 crop years are all positive. All results for the 1996/97 crop year are negative but, on the whole, are closer to zero in absolute terms than the others. Some scenario results of the 1994/95 crop year are negative. These results are obtained from the full discounting of the difference between the PRO and the sum of the initial and adjustment payments as they are made. The results suggest that either the discount rate is too high, the portion of the PRO discounted is too high, or the PRO tends to be biased downward. However, five years of simulation are a small sample on which to base any strong conclusions. Just as with the FPC, the weekly net positions are bigger than the monthly net positions for all the scenarios with the exception of the scenarios for the 1997/98 crop year and scenarios 3 and 4 for the 1995/96 crop year.

5.2.1 Participation

The CWB net position under different participation scenarios for the EPCO should be smaller than the net positions for the FPC since more information is available at the time the EPCO is signed.

The net EPCO position results are found in Table 7, which were compiled using Tables A15-A26. Comparing Table 5 with Table 7 shows that this relationship is true for all the crop years with the exception of 1993/94 crop year. The 1993/94 result may be related to the sharp upward movement in prices at the end of the sales period (see Figure 2 Appendix 2).

Also, the 1994/95 and 1997/98 results show that, as expected, the net positions from the increasing participation results are the lowest, followed by those of the equal participation and then decreasing participation. The results from the other crop years are not totally consistent with this expectation. No scenario has consistent participation scenario results across the crop years. The reading of this table is similar to that of the FPC table described above. Generally, the CWB net position with the EPCO is closer to zero than the FPC contract. This result is expected since there is more information available when pricing EPCO contracts.

Increasing farm participation in EPCO contracts where the majority of contracts are signed near the end of the crop year should result in CWB net positions closer to zero. Generally, only small differences in the CWB net position are observed in Table 7. A closer look at the commodity and currency hedge position results (Tables A3 to A26 in Appendix 3) show that, as expected, the commodity and currency hedge values for the EPCO are less than those for the FPC. Hence, the main determinant of the unexpected net hedge plus cash position is the cash position[11]. The cash position for the 1993/94 crop year is so large that the commodity and currency hedge positions could not effectively reduce it. Possible reasons for this aberration have been mentioned above.

One other area of concern is the results of the net hedge plus cash position for Scenarios 3 and 4 for the 1994/95 crop year which are smaller, relative to the other scenarios, than those of the other years. The difference between Scenarios 1 and 2 on the one hand, and Scenarios 3 and 4 on the other, is the distribution of sales (see Tables 2 and 3). Scenarios 1 and 2 combine the unequal distribution of sales with the two weightings on the exchanges while Scenarios 3 and 4 use the equal distribution of sales with the two weightings on the exchanges. Hence, the relatively lower than usual results for Scenarios 3 and 4 for the 1994/95 crop year (Table 7) could be due to the assumption of equal distribution of sales vis-à-vis the futures price trend for that crop year (Figure

[11] The cash position is a 'no risk management' position.

3 in Appendix 2). The assumption of equal monthly sales, despite the futures price trend, produced losses. The losses are larger for Scenarios 3 and 4 than for Scenarios 1 and 2 (see Table A15-A18 in Appendix 1). A look at these tables shows that the losses for the 1994/95 crop year have been the largest among all the crop years for all the scenarios.

5.2.2 Trading Pattern

The proportion of trading on the CBOT was increased to 60% while those of KCBT and MGE were reduced to 20% as further analysis of the impact of increasing the trading on the more liquid CBOT contracts. The results reported in Table 8, when compared to Scenario 1 under the equal participation scenario in Table 7, show a higher CWB net position, with the exception of 1996/97 crop year. Again this suggests that greater use of the CBOT contracts reduces the effectiveness of the risk management program slightly.

5.3 Contingency Fund

The results reported above evaluate the CWB program on a per tonne basis. Farm participation levels, exchange trading, etc., provide useful scenario information but these do not directly answer these two questions:

- How affective will the CWB risk management program be?
- How large a contingency fund is required?

Table 9 provides a dollar estimate of the CWB net position for different levels of farm participation. Assuming 100,000 tonnes are contracted under the FPC and 100,000 tonnes contracted under EPCO, the net CWB positions after running a risk management program for equal farm participation in the contract months are as follows:

1993/94 crop year	$0.52M,
1994/95 crop year	$2.38M,
1995/96 crop year	$1.51M,
1996/97 crop year	$0.17M, and
1997/98 crop year	$3.83M.

The positive results suggest that the FPC and EPCO contract prices may be set too low in the simulation. Tonnages including 200,000, 500,000, 1,000,000 and 4,000,000 are also presented in the table. No spread risks are included.

Table 10 shows the breakdown of the CWB positions into commodity, currency and cash positions, assuming equal levels of farm participation in the FPC and the EPCO. This provides a quick measure of how effective the risk management program might be. Cash positions represent the difference between the FPC/EPCO pay out and the final pool value. This is the total CWB risk with no risk management program. Commodity position is the hedge position from wheat futures trading only. The currency position is the futures position from currency trading only. For example, in 1993/94 the commodity hedge position had a loss of $2.3 M, the currency hedge position had a loss of $1.1 M and the CWB had a gain on FPC of $3.0M when 100,000 tonnes were contracted. Thus, the net position of the CWB after risk management transactions for the FPC was a loss of about -$0.35M (Table 10). Overall, the net positions from EPCO contracts are lower than those from FPC except for 1993/94. However, in absolute terms, the risk management program appears to be more affective for the FPC. A greater portion of the risk assumed by the CWB appears to be managed under the FPC simulation.

5.4 Grade Spread Risks

The results of the analysis for the grade spread risk for the FPC contracts are found in Table 11. The results, as mentioned above, are based on the historical distribution of grade risk among #1 CWRS and #2 CWRS, and between #1 and #3 CWRS. Protein grade distribution is ignored in the analysis. The results show the position of the CWB over the years in trading wheat of the three grades. The results show that the grade spread risk between #1 and #2 for the 1993/94 crop year is a loss of about 63 cents per tonne to the CWB while the spread risk for the 1995/96 crop year is a gain of about 74 cents per tonne. The spread risk between #1 and #3 are also presented. For example, total spread risk for 1993/94 is –1.96 per tonne for FPC. Viewed in the light of the total tonnage that the CWB trades within a crop year, the spread risk can greatly affect the net position of the CWB. Unfortunately, the hedging program cannot be used to hedge this risk. EPCO grade spread risk was not evaluated. However, it should be less than those associated with FPC due to better information.

6 Conclusion

This study measured the effectiveness of using public risk markets to manage the risks associated with the CWB offering Fixed Price Contracts (FPC) and Early Pool Cash Outs (EPCO) on CWRS wheat. The FPC is a forward contract on the pool value offered before the crop year begins. The EPCO is essentially an early cash out of the final payment that is made during the crop year. A key constraint of the analysis in this study was that the wheat contracted under these programs was still included in the calculation of the final pool price.

The risks evaluated in the historical simulation were price risks, grade risks and exchange rate risks associated with offering FPC and EPCO contracts. The CBOT, KCBT, MGE and IMM were the public risk markets used in the simulation from the 1993/94 crop year to the 1997/98 crop years. Alternative scenarios were evaluated to measure the impact of other variables such as rate of farm participation, more extensive use of the CBOT wheat futures for wheat hedging, and changes in the timing of CWB sales. Some of these risks are not controllable, but the results do provide some awareness of the potential CWB risk.

The annual CWB price risk associated with offering the FPC on 100,000 tonnes of CWRS wheat ranged from –$5.2 million to $ 7.2 million over the study period, if no risk management activities were undertaken (see Table 10). Adding a risk management program utilizing currency futures and wheat futures reduced the dollar range of outcomes from –$0.35 M to $2.6 M. These results do not include any measure of grade spread risk. The EPCO risk is lower. The annual CWB risk from offering the EPCO on 100,000 tonnes ranged from –$0.05 M to $1.6 M, if no risk management activities were undertaken (see Table 10). Adding a risk management program utilizing currency futures and wheat futures reduced this range to -$0.15M to $1.3M. As expected, using a hedging program based on wheat futures and Canada/US currency futures would have significantly reduced the CWB risk over the 1993/94 – 1997/98 time period but did not eliminate the risk. The risk associated with EPCO is generally substantially lower than with the FPC. This is principally due to the reduced forecast errors in the PRO and EPRs of the CWB, after the Northern Hemisphere harvests are completed. That is, as the crop year progresses there is less uncertainty about the price forecast on the pool.

Any hedging program to manage the risk of offering the FPC or EPCO will require that the CWB risk management team make assumptions about the expected timing of CWB wheat sales. This leads to two possible issues. First, the CWB risk management team should try to place futures positions to match the expected timing of sales. This will not be directly possible with FPC contracts since prior to seeding, futures contracts with the necessary liquidity are not available over the entire period of the CWB sales program. Thus, some forward rolling of futures contracts from nearby months to more distant months will be required later in the crop year. Second, the CWB has risk arising from the timing of sales. If the actual sales program differs from the expected sales program, the CWB net dollar position could change. However, the CWB in practice will have the ability to immediately change their hedge program to match the new expected sales program. Different sales timing in the year, however, does change the CWB risk, even when the sales program is matched up with the risk management program. Scenario results using different assumptions on the timing of sales showed up to a $7/tonne change in the CWB net cash position for FPCs and a $5/tonne change in the CWB position for EPCOs. Expected timing of sales, actual sales, and the associated hedge program, will have a major impact on the CWB final cash position.

The pattern of farm participation may also impact on risk. Farm participation may increase or decrease over the crop year. That is, more farm managers may sign up for FPC or EPCO later in the year rather earlier in the year. Scenario analysis of different patterns of farm sign up did not show a consistent set of CWB dollar outcomes. However it did indicate that this is another source of risk. The CWB net dollar outcome could change by over $5/tonne using the base case scenario.

The MGE wheat futures contract most closely matches the wheat grades evaluated in this study. However, this futures contract is the least liquid of the three wheat futures contracts evaluated. The CWB is a major wheat player and futures market liquidity may be a CWB constraint when managing this program. A scenario that used substantially more wheat futures from the CBOT, the most liquid wheat futures contract, evaluated the impact of increased use of the CBOT contract for risk management. This scenario still reduced the CWB risk but in general was slightly less affective as a risk management tool. The total size of the FPC and EPCO program will place constraints on the most effective risk management program. Since there is an extremely liquid over-the-counter market in forward contracts for currency, we do not view the CWB's ability to

currency hedge as a significant constraint.

Generally, forward contracts specify grade discounts. This is another source of risk and a simple measure evaluated the grade price spread risk between #1 CWRS, #2CWRS and #3CWRS for the FPC. Protein grade risk was not evaluated. In general, the grade price spread risk was smaller than the price risk. It did range from -$2.0/tonne to $2.1/tonne annually. EPCO grade spread risk was not evaluated but it should be much lower than the spread risk associated with FPC.

The CWB needs to determine what risk premium to use when setting the FPC price or the EPCO price based on the PRO or EPR. The simulation used a Government of Canada discount rate on either 25% or 15% of the PRO for the FPC. For the FPC, the timing of the payments were ignored and the range of discounts on either 25% or 15% of the PRO was used as a proxy for measuring the impact of timing of payment. Under these scenarios, the CWB would have been in a net positive position over the five years of the simulation. Indeed, our results show that, generally, the CWB position is positive every year when evaluating only price risk under our base case scenario. This suggests three possibilities, not necessarily independent of each other. First, the PRO may have been somewhat downward biased over this time period. Second, the discount rate, or more specifically the portion of the PRO discounted was too large. Third, five years is a very short time period and the variability of the markets makes it difficult to make any definitive conclusions about the direction of PRO bias or the discount rate to use. However, a Government of Canada bond rate on 20 or 25% of the PRO may be a reasonable starting point when pricing FPC contracts. This assumes that initial payments continue to be set at about 75% of the PRO forecast.

Any FPC or EPCO risk management program implemented by the CWB will not completely remove the risk to the pool account. The results reported above would suggest the following guidelines for the size of a contingency fund assuming 500,000 tonnes are enrolled under the FPC and 500,000 tonnes are enrolled under the EPCO. Thirty million dollars ($30 M) would appear to be of sufficient size to handle possible negative CWB dollar outcomes for at least two years. This assumes that under the historical simulation, the CWB positive cash positions could just as likely have been a negative if other years were available to simulate. However, should the CWB contingency start to approach zero, farm managers may forecast that the CWB will increase the risk

discount. This may reduce future farm participation.

Transaction costs and in particular costs of implementing these programs may be substantial. These costs were not evaluated in this study. Unfortunately, there is no way to accurately predict what the farm demand for these products might be. If the demand was small, the program costs per tonne could be relatively large on a per tonne basis. Alternatively if demand is high, the CWB may have to limit participation to keep CWB risks to a manageable size. The issue of participation is discussed in the earlier study by Unterschultz and Novak (1997).

The study demonstrated a system of managing the risks involved in offering FPC and EPCO. Historical simulations, the methodology used here, does not guarantee that these results will hold in the future. These results should be used as a guideline, however, if the CWB decides to introduce either FPC or EPCO. Clearly, the introduction of an EPCO contract will pose a lower level of risk per tonne to the CWB than offering FPC.

7 References

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8 TABLES

Table 1. Price Return Outlook in CAD (C$) for #1 CWRS

Crop Year	*Date*	*PRO Per tonne (low)*	PRO *Per tonne (high)*	Average *PRO per tonne*	*2-Yr Gov. of Canada Bond Rate (%)*	*Average FPC1*** per tonne*	*Average FPC2** per tonne*	*Final Payment per tonne*
93/94	199302	N/A	N/A					
	199303	135*	145*	140*	6.41	136.23	137.74	164.01
	199304	135	145	140.00	6.5	136.18	137.71	
	199305	131	141	136.00	6.28	132.41	133.84	
	199306	127	137	132.00	5.89	128.71	130.03	
94/95	199402	N/A	N/A					
	199403	133	143	138.00	6.71	134.13	135.68	195.59
	199404	133	143	138.00	6.84	134.06	135.64	
	199405	138	148	143.00	7.42	138.60	140.36	
	199406	138	143	140.50	8.36	135.69	137.62	
95/96	199502	168	178	173.00	8.06			
	199503	173	183	178.00	7.97	172.16	174.50	254.16
	199504	177	187	182.00	7.65	176.25	178.55	
	199505	186	196	191.00	7.04	185.40	187.64	
	199506	193	203	198.00	6.74	192.42	194.65	
96/97	199602	225	245	235.00	5.8			
	199603	225	245	235.00	6.14	228.92	231.35	208.20
	199604	263	283	273.00	6.1	265.98	268.79	
	199605	271	291	281.00	6.06	273.82	276.69	
	199606	266	286	276.00	6.29	268.70	271.62	
97/98	199702	160	190	175.00	4.29			
	199703	160	190	175.00	4.64	171.51	172.91	190.76
	199704	176	206	191.00	4.8	187.07	188.64	
	199705	171	201	186.00	4.66	182.27	183.76	
	199706	171	201	186.00	4.27	182.57	183.94	

Notes

* There was no PRO for March 1993. April 1993 PRO was used.

199303 = March 1993

FPC1*** is Contract Price discounting 25% of PRO

$$FPC1 \quad value_i = \left\{ \left(0.25 * PRO_i\right) \Big/ \left(1+r\right)^{T-t} \right\} + \left(0.75 * PRO_i\right)$$

FPC2** is Contract Price Discounting 15% of PRO

$$FPC \quad 2 \quad value \quad _i = \left\{ \left(0.15 * PRO \quad _i\right) \Big/ \left(1 + r\right)^{T \; - \; t} \right\} + \left(0.85 * PRO \quad _i\right)$$

Table 2. Anticipated CWB Sales during crop year (in Percentages)

Month	Scenario 1 (Base)	Scenario 2	Scenario 3	Scenario 4
June	3	3	5.9	5.9
July	1	1	5.9	5.9
August	6	6	5.9	5.9
September	8	8	5.9	5.9
October	14	14	5.9	5.9
November	8	8	5.9	5.9
December	8	8	5.9	5.9
January	8	8	5.9	5.9
February	7	7	5.9	5.9
March	7	7	5.9	5.9
April	5	5	5.9	5.9
May	5	5	5.9	5.9
June	4	4	5.9	5.9
July	4	4	5.9	5.9
August	4	4	5.9	5.9
September	4	4	5.9	5.9
October	4	4	5.9	5.9
Total	100	100	100	100

Table 3. Percentage of each FPPA Position traded on Wheat Futures Exchanges

Exchange	Scenario 1 (Base)	Scenario 2	Scenario 3	Scenario 4
CBOT	20	10	20	10
KCBT	40	15	40	15
MGE	40	75	40	75
Total	100	100	100	100

Table 4. CWB Net Cash plus Hedge Position on Offering FPC in CAD (C$) per tonne using FPC1* and FPC2* to calculate Cash Position

CWB Net Cash plus Hedge Position on Offering FPC in C$ per tonne using FPC1*

Monthly Offsetting

Crop Year **Scenario**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**
1	-3.54	19.43	10.22	3.12	25.53
2	-7.60	21.11	10.40	3.02	18.91
3	-7.57	12.49	13.92	-1.16	25.76
4	-11.00	17.73	12.23	-2.24	18.44

Weekly Offsetting

Crop Year **Scenario**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**
1	-2.67	27.67	13.71	2.87	22.72
2	-5.61	28.97	15.99	4.75	16.80
3	-6.19	24.81	16.20	-2.12	22.38
4	-9.06	26.27	18.53	-0.45	15.82

CWB Net Cash plus Hedge Position on Offering FPC in C$ per tonne using FPC2*

Monthly Offsetting

Crop Year **Scenario**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**
1	-4.90	17.85	8.09	0.54	24.17
2	-8.96	19.53	8.27	0.44	17.55
3	-8.93	10.91	11.79	-3.74	24.43
4	-12.36	16.15	10.10	-4.82	17.08

Weekly Offsetting

Crop Year **Scenario**	**1993/94**	**1994/95**	**1995/96**	**1996/97**	**1997/98**
1	-4.03	26.09	11.58	0.29	21.36
2	-6.97	27.39	13.86	2.17	15.44
3	-7.55	23.23	14.07	-4.70	21.02
4	-10.42	24.69	16.40	-3.03	14.46

Notes

Monthly Offsetting = Hedge values from lifting wheat hedges once a month
Weekly Offsetting = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)
Scenario 1= unequal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively
Scenario 2= unequal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively
Scenario 3= equal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively
Scenario 4= equal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively

Table 5. CWB Net Positions on Offering FPC with different Farm Participation Levels

Monthly Offsetting															
Crop Year															
	1993/94			**1994/95**			**1995/96**			**1996/97**			**1997/98**		
	EP	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*
Scenario 1	-3.54	-3.65	-5.47	19.43	21.50	17.46	10.22	9.23	11.20	3.12	5.07	1.76	25.53	22.71	28.36
Scenario 2	-7.60	-7.78	-8.97	21.11	23.12	19.04	10.40	9.76	10.84	3.02	5.95	0.97	18.91	16.06	21.76
Scenario 3	-7.57	-6.88	-9.30	12.49	14.58	10.17	13.92	13.06	14.76	-1.16	1.21	-3.54	25.79	23.02	28.57
Scenario 4	-11.00	-11.19	-12.74	17.73	16.73	12.30	12.23	11.73	12.70	-2.24	1.35	-4.91	18.44	15.71	21.19
Weekly Offsetting															
Crop Year															
	1993/94			**1994/95**			**1995/96**			**1996/97**			**1997/98**		
	EP	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*
Scenario 1	-2.67	-1.28	-4.25	27.67	29.81	25.43	13.71	12.11	15.29	2.87	3.57	2.12	22.72	19.79	25.67
Scenario 2	-5.61	-4.41	-7.29	28.97	30.77	26.54	15.99	14.23	17.74	4.75	6.33	3.31	16.80	13.95	19.65
Scenario 3	-6.19	-4.35	-8.26	24.81	27.03	22.14	16.20	14.22	18.17	-2.12	-0.95	-3.29	22.38	19.49	25.29
Scenario 4	-9.06	-4.84	-9.60	26.27	28.60	23.75	18.53	16.27	20.79	-0.45	1.41	-2.52	15.82	13.08	18.58
Notes															
Monthly Offsetting = Hedge values from lifting wheat hedges once a month using FPC2 (discounting 25% of PRO)															
Weekly Offsetting = Hedge values from lifting hedges once a week using FPC2(discounting 25% of PRO)															
EP = Equal Participation in each contract month															
IP = Increasing Participation, i.e., 10% March, 20%April, 30% May, 40% June															
DP = Decreasing Participation, i.e., 40% March, 30% April, 20% May, 10% June															
Scenario 1= unequal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively															
Scenario 2= unequal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively															
Scenario 3= equal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively															
Scenario 4= equal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively															

Table 6. Values of FPC Hedges in CAD for Equal Participation with Different Wheat Futures Trading Pattern.

Assumption: CBOT 60%, KCBT 20%,MGE 20% Trading with Equal Level of Participation in Contract Months

			Net Wheat Hedge Position		Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment – FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment – FPC2*)	Net Cash + Hedge Position (FPC2*)
1993/94 Crop Year										
Wheat				**Currency**						
CBOT	KCBT	MGE								
Monthly				*Monthly*						
-9.47	-4.32	-5.95	-19.73		-10.03	-29.77	30.4	0.63	29.04	-0.73
Weekly				*Weekly*						
-8.05	-4.23	-5.39	-17.67		-10.15	-27.82		2.58		1.22
1994/95 Crop Year										
Monthly				*Monthly*						
-21.80	-9.93	-8.13	-39.86		3.11	-36.75	59.68	22.93	58.09	21.34
Weekly				*Weekly*						
-17.24	-7.98	-6.53	-31.75		3.06	-28.69		30.99		29.40
1995/96 Crop Year										
Monthly				*Monthly*						
-32.72	-14.87	-13.83	-61.42		5.66	-55.76	72.24	16.48	70.11	14.35
Weekly				*Weekly*						
-32.73	-14.63	-12.45	-59.80		5.83	-53.97		18.27		16.14
1996/97 Crop Year										
Monthly				*Monthly*						
33.26	11.31	11.38	55.95		-1.30	54.65	-51.62	3.03	-54.2	0.45
Weekly				*Weekly*						
29.56	10.91	11.78	52.25		-0.70	51.55		-0.07		-2.65
1997/98 Crop Year										
Monthly				Monthly						
22.79	7.94	4.53	35.26		-14.97	20.29	9.66	29.95	8.3	28.59
Weekly				Weekly						
18.91	7.00	3.91	29.82		-13.45	16.37		26.03		24.67

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

FPC1* = Full PRO FPC (FPC obtained from discounting 25% of PRO) . FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table 7. CWB Net Positions on Offering EPCO in CAD with different Farm Participation

Monthly Offsetting															
Crop Year															
	1993/94			**1994/95**			**1995/96**			**1996/97**			**1997/98**		
	EP	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*
Scenario 1	8.57	8.85	8.28	4.36	2.80	5.94	4.87	4.59	5.16	-1.44	1.08	-3.97	12.78	11.82	13.73
Scenario 2	8.35	8.66	8.04	4.54	2.86	6.23	5.55	4.91	6.19	-2.08	0.49	-4.65	10.96	10.57	11.34
Scenario 3	7.24	7.42	7.05	-0.67	-1.84	0.50	4.84	5.38	4.29	-2.34	0.57	-5.26	15.22	14.06	16.37
Scenario 4	6.94	7.14	6.74	-0.51	-1.82	0.81	5.50	5.69	5.31	-3.27	-0.31	-6.23	12.94	12.44	13.44
Weekly Offsetting															
Crop Year															
	1993/94			**1994/95**			**1995/96**			**1996/97**			**1997/98**		
	EP	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*	*EP*	*IP*	*DP*
Scenario 1	9.19	9.25	9.13	5.72	4.04	7.41	5.44	4.72	6.15	-1.20	1.30	-3.70	12.52	11.61	13.41
Scenario 2	9.24	9.25	9.23	5.90	4.13	7.69	6.17	5.14	7.20	-1.61	0.92	-4.15	10.72	10.37	11.06
Scenario 3	8.00	7.98	8.02	1.44	0.05	2.84	4.68	4.99	4.37	-1.99	0.87	-4.85	14.90	13.79	15.99
Scenario 4	8.00	7.93	8.08	1.63	0.11	3.16	5.47	5.46	5.48	-2.61	0.28	-5.50	12.64	12.18	13.10
Notes															
Monthly Offsetting = Hedge values from lifting wheat hedges once a month															
Weekly Offsetting = Hedge values from lifting hedges once a week															
EP = Equal Participation in each contract month															
IP = Increasing Participation, i.e., 10% September, 20%December, 30% March, 40% June															
DP = Decreasing Participation, i.e., 40% September, 30% December, 20% March, 10% June															
Scenario 1= unequal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively															
Scenario 2= unequal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively															
Scenario 3= equal distribution of sales with 20:40:40 trading on CBOT, KCBT and MGE respectively															
Scenario 4= equal distribution of sales with 10:15:75 trading on CBOT, KCBT and MGE respectively															

Table 8. Value of EPCO Hedge Values for new Trading Pattern

				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment – (EPCO + Initial + Adjustment Payment))	Net Cash + Hedge Position
					1993/94 Crop Year							
Wheat	CBOT	KCBT	MGE		**Currency**	CBOT	KCBT	MGE				
Monthly	-3.31	-1.40	-1.44	-6.16	*Monthly*	-0.39	-0.13	-0.13	-0.65	-6.81	16.02	9.21
Weekly	-3.24	-1.30	-1.21	-5.76	*Weekly*	-0.42	-0.15	-0.14	-0.71	-6.47		9.55
					1994/95 Crop Year							
Wheat	CBOT	KCBT	MGE		**Currency**	CBOT	KCBT	MGE				
Monthly	-5.26	-2.21	-1.99	-9.46	*Monthly*	0.10	0.03	0.04	0.17	-9.28	14.33	5.05
Weekly	-3.78	-1.57	-1.42	-6.77	*Weekly*	0.12	0.04	0.05	0.21	-6.57		7.76
					1995/96 Crop Year							
Wheat	CBOT	KCBT	MGE		**Currency**	CBOT	KCBT	MGE				
Monthly	-4.48	-2.23	-1.64	-8.35	*Monthly*	0.19	0.08	0.08	0.35	-8.00	13.72	5.72
Weekly	-4.11	-2.18	-1.54	-7.83	*Weekly*	0.28	0.11	0.11	0.50	-7.33		6.39
					1996/97 Crop Year							
Wheat	CBOT	KCBT	MGE		**Currency**	CBOT	KCBT	MGE				
Monthly	0.68	-0.12	-0.36	0.20	*Monthly*	-0.43	-0.15	-0.15	-0.73	-0.53	-0.46	-0.99
Weekly	0.66	-0.18	-0.28	0.21	*Weekly*	-0.33	-0.11	-0.12	-0.55	-0.35		-0.81
					1997/98 Crop Year							
Wheat	CBOT	KCBT	MGE		**Currency**	CBOT	KCBT	MGE				
Monthly	10.12	2.95	2.07	15.14	*Monthly*	-1.63	-1.00	-0.74	-3.36	11.78	2.93	14.71
Weekly	9.89	2.78	1.94	14.61	*Weekly*	-1.85	-0.62	-0.65	-3.12	11.50		14.43

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table 9. Estimated Contingency Fund Requirements for FPC and EPCO using Base Scenario and Monthly Futures Contract Offsetting Arrangements

Year	FPC*				EPCO**				**TOTAL REQUIREMENT (C$)**		
	Tonnage	***Participation Level***			***Tonnage***	***Participation Level***					
		Equal	**Increasing**	**Decreasing**		**Equal**	**Increasing**	**Decreasing**	**Equal**	**Increasing**	**Decreasing**
1993/94	100,000	-354,000	-365,000	-547,000	100,000	857,000	885,000	828,000	503,000	520,000	281,000
1994/95		1,943,000	2,150,000	1,746,000		436,000	280,000	594,000	2,379,000	2,430,000	2,340,000
1995/96		1,022,000	923,000	1,120,000		487,000	459,000	516,000	1,509,000	1,382,000	1,636,000
1996/97		312,000	507,000	176,000		-144,000	108,000	-397,000	168,000	615,000	-221,000
1997/98		2,553,000	2,271,000	2,836,000		1,278,000	1,182,000	1,373,000	3,831,000	3,453,000	4,209,000
1993/94	500,000	-1,770,000	-1,825,000	-2,735,000	500,000	4,285,000	4,425,000	4,140,000	2,515,000	2,600,000	1,405,000
1994/95		9,715,000	10,750,000	8,730,000		2,180,000	1,400,000	2,970,000	11,895,000	12,150,000	11,700,000
1995/96		5,110,000	4,615,000	5,600,000		2,435,000	2,295,000	2,580,000	7,545,000	6,910,000	8,180,000
1996/97		1,560,000	2,535,000	880,000		-720,000	540,000	-1,985,000	840,000	3,075,000	-1,105,000
1997/98		12,765,000	11,355,000	14,180,000		6,390,000	5,910,000	6,865,000	19,155,000	17,265,000	21,045,000
1993/94	1,000,000	-3,540,000	-3,650,000	-5,470,000	1,000,000	8,570,000	8,850,000	8,280,000	5,030,000	5,200,000	2,810,000
1994/95		19,430,000	21,500,000	17,460,000		4,360,000	2,800,000	5,940,000	23,790,000	24,300,000	23,400,000
1995/96		10,220,000	9,230,000	11,200,000		4,870,000	4,590,000	5,160,000	15,090,000	13,820,000	16,360,000
1996/97		3,120,000	5,070,000	1,760,000		-1,440,000	1,080,000	-3,970,000	1,680,000	6,150,000	-2,210,000
1997/98		25,530,000	22,710,000	28,360,000		12,780,000	11,820,000	13,730,000	38,310,000	34,530,000	42,090,000
1993/94	4,000,000	-14,160,000	-14,600,000	-21,880,000	4,000,000	34,280,000	35,400,000	33,120,000	20,120,000	20,800,000	11,240,000
1994/95		77,720,000	86,000,000	69,840,000		17,440,000	11,200,000	23,760,000	95,160,000	97,200,000	93,600,000
1995/96		40,880,000	36,920,000	44,800,000		19,480,000	18,360,000	20,640,000	60,360,000	55,280,000	65,440,000
1996/97		12,480,000	20,280,000	7,040,000		-5,760,000	4,320,000	-15,880,000	6,720,000	24,600,000	-8,840,000
1997/98		102,120,000	90,840,000	113,440,000		51,120,000	47,280,000	54,920,000	153,240,000	138,120,000	168,360,000
Notes											
1. Base Scenario uses unequal distribution of sales combined with 20:40:40 trading on CBOT, KCBT and MGE respectively.											
2. Equal Participation assumes equal signup for all contract months.											
3. Increasing Participation assumes contract signup increases proportionately from 10% of tonnage in first contract month to 40% in last contract month.											
4. Decreasing Participation assumes contract signup decreases proportionately from 40% of tonnage in first contract month to 10% in last contract month											
5. * FPC contracts are offered in March, April, May and June immediately following PRO announcement											
6. ** EPCO contracts are offered during crop year in September, December, March, and June (following year)											

Table 10. Evaluation of Risk Management Program using Base Scenario and Monthly Futures Contract Offsetting Arrangements

Year	FPC*				EPCO**				**TOTAL NET POSITION**	
	Tonnage	***Positions***			***Tonnage***	***Positions***			**FPC**	**EPCO**
		Commodity	**Currency**	**Cash**		**Commodity**	**Currency**	**Cash**		
1993/94	100,000	-2,324,000	-1,070,000	3,040,000	100,000	-680,000	-66,000	1,602,000	-354,000	856,000
1994/95		-4,336,000	312,000	5,967,000		-1,015,000	18,000	1,433,000	1,943,000	436,000
1995/96		-6,831,000	629,000	7,224,000		-924,000	39,000	1,372,000	1,022,000	487,000
1996/97		5,636,000	-162,000	-5,162,000		-25,000	-74,000	-46,000	312,000	-145,000
1997/98		3,254,000	-1,667,000	966,000		1,342,000	-356,000	293,000	2,553,000	1,279,000
1993/94	500,000	-11,620,000	-5,350,000	15,200,000	500,000	-3,400,000	-330,000	8,010,000	-1,770,000	4,280,000
1994/95		-21,680,000	1,560,000	29,835,000		-5,075,000	90,000	7,165,000	9,715,000	2,180,000
1995/96		-34,155,000	3,145,000	36,120,000		-4,620,000	195,000	6,860,000	5,110,000	2,435,000
1996/97		28,180,000	-810,000	-25,810,000		-125,000	-370,000	-230,000	1,560,000	-725,000
1997/98		16,270,000	-8,335,000	4,830,000		6,710,000	-1,780,000	1,465,000	12,765,000	6,395,000
1993/94	1,000,000	-23,240,000	-10,700,000	30,400,000	1,000,000	-6,800,000	-660,000	16,020,000	-3,540,000	8,560,000
1994/95		-43,360,000	3,120,000	59,670,000		-10,150,000	180,000	14,330,000	19,430,000	4,360,000
1995/96		-68,310,000	6,290,000	72,240,000		-9,240,000	390,000	13,720,000	10,220,000	4,870,000
1996/97		56,360,000	-1,620,000	-51,620,000		-250,000	-740,000	-460,000	3,120,000	-1,450,000
1997/98		32,540,000	-16,670,000	9,660,000		13,420,000	-3,560,000	2,930,000	25,530,000	12,790,000
1993/94	4,000,000	-92,960,000	-42,800,000	121,600,000	4,000,000	-27,200,000	-2,640,000	64,080,000	-14,160,000	34,240,000
1994/95		-173,440,000	12,480,000	238,680,000		-40,600,000	720,000	57,320,000	77,720,000	17,440,000
1995/96		-273,240,000	25,160,000	288,960,000		-36,960,000	1,560,000	54,880,000	40,880,000	19,480,000
1996/97		225,440,000	-6,480,000	-206,480,000		-1,000,000	-2,960,000	-1,840,000	12,480,000	-5,800,000
1997/98		130,160,000	-66,680,000	38,640,000		53,680,000	-14,240,000	11,720,000	102,120,000	51,160,000
Notes										
1. Base Scenario uses unequal distribution of sales combined with 20:40:40 trading on CBOT,KCBT and MGE respectively.										
2. Table based on Equal Farm Participation assumption i.e., equal signup in contract months										
3. * FPC contracts are offered in March, April, May and June immediately following PRO announcement. Cash Position based on FPC2.										
4. ** EPCO contracts are offered during crop year in September, December, March, and June (following year)										

Table 11. Grade Spread Risk for FPC contracts

Crop Year	Final Pool Price			Actual Price Spread		Simulated Grade Spread Risk		Spread Risk	
								Total per tonne	Total for 100,000 tones
	#1CWRS	#2CWRS	#3CWRS	#1 - #2	#1 - #3	#1-#2	#1-#3		
1993/94	164.01	155.46	142.82	8.55	21.19	-0.627	-1.334	-1.962	-196,176
1994/95	195.59	189.45	180.11	6.14	15.48	-0.034	-0.275	-0.309	-30,913
1995/96	254.16	251.169	247.602	2.991	6.558	0.740	1.381	2.121	212,145
1996/97	208.195	204.712	196.794	3.483	11.401	0.619	0.482	1.102	110,156
1997/98	190.757	188.12	177.21	2.642	13.545	0.826	0.084	0.911	91,052

Notes:

The historical price spread between #1 and #2 and #1 and #3 is $6 and $14 respectively. These values were used for the quoted spreads in the FPC.

9 APPENDIX 1. Tables

Table A1:Description of Hedging Program for Fixed Price Contract

Date (Contract Months are in bold)	Monthly Activity	% Projected Sales (Cumulative)	Suggested risk management strategies using divisible Futures Contracts		
			CBOT (20%)	**KCBT (40%)**	**MGE (40%)**
Mar 11 1998	Farmer signs FPC with CWB to deliver 1 tonne of wheat in October 1998		Short the following: 20% of 0.0588 tonne on July 98 futures to cover June 98; 20% of 0.1176 tonne on Sep 98 futures to cover July & Aug 98; 20% of 0.1764 tonne on Dec 98 futures contract to cover Sep, Oct, & Nov 98; 20% of 0.1764 on Mar 99 futures to cover Dec 98, Jan 99 and Feb 99; 20% of 0.1176 tonne on May 99 to cover Mar and April 99; 20% of 0.1176 tonne on July 99 futures to cover May & June 99; 20% of 0.1176 tonne on Sep 99 futures contract to cover July and Aug; 20% of 0.1176 tonne using Dec 99 to cover Sep and Oct 99. If further out contract unavailable sequential rollover technique used. We assume May 99 contract unavailable in March 98 and March 99 contract used for rolling over to explain this technique.)	Short the following: 40% of 0.0588 tonne on July 98 futures to cover June 98; 40% of 0.1176 tonne on Sep 98 futures to cover July & Aug 98;40% of 0.1764 tonne on Dec 98 futures contract to cover Sep, Oct, & Nov 98; 40% of 0.1764 on Mar 99 futures to cover Dec 98, Jan 99 and Feb 99; 40% of 0.1176 tonne on May 99 to cover Mar and April 99; 40% of 0.1176 tonne on July 99 futures to cover May & June 99; 40% of 0.1176 tonne on Sep 99 futures contract to cover July and Aug; 40% of 0.1176 tonne using Dec 99 to cover Sep and Oct 99. If further out contract unavailable sequential rollover technique used. We assume May 99 contract unavailable in March 98 and March 99 contract used for rolling over to explain this technique.)	Short the following: 40% of 0.0588 tonne on July 98 futures to cover June 98; 40% of 0.1176 tonne on Sep 98 futures to cover July & Aug 98;40% of 0.1764 tonne on Dec 98 futures contract to cover Sep, Oct, & Nov 98; 40% of 0.1764 on Mar 99 futures to cover Dec 98, Jan 99 and Feb 99; 40% of 0.1176 tonne on May 99 to cover Mar and April 99; 40% of 0.1176 tonne on July 99 futures to cover May & June 99; 40% of 0.1176 tonne on Sep 99 futures contract to cover July and Aug; 40% of 0.1176 tonne using Dec 99 to cover Sep and Oct 99. If further out contract unavailable sequential rollover technique used. We assume May 99 contract unavailable in March 98 and March 99 contract used for rolling over to explain this technique.)
Apr-98					
May-98					
Jun-98	First Sale by CWB. End of FPCs.	5.882	Unwind 20% of 0.0588 tonne of July contract .	Unwind 40% of 0.0588 tonne of July contract .	Unwind 40% of 0.0588 tonne of July contract.
Jul-98	Initial Payment announced	11.764	Unwind 20% of 0.0588 tonne of September contract to cover July.	Unwind 40% of 0.0588 tonne of September contract to cover July.	Unwind 40% of 0.0588 tonne of September contract to cover July.

Date (Contract Months are in bold)	**Monthly Activity**	**% Projected Sales (Cumulative)**	**Suggested risk management strategies using divisible Futures Contracts**		
			CBOT (20%)	**KCBT (40%)**	**MGE (40%)**
Aug-98	1998/99 Crop Year Begins. Beginning of EPCO contracts.	17.647	Unwind 40% of 0.0588 tonne of September contract to cover August.	Unwind 40% of 0.0588 tonne of September contract to cover August.	Unwind 40% of 0.0588 tonne of September contract to cover August.
Sep-98		23.529	Unwind 20% of 0.0588 tonne of December contract.	Unwind 40% of 0.0588 tonne of December contract.	Unwind 40% of 0.0588 tonne of December contract.
Oct-98	Physical Delivery of 1 tonne	29.411	Unwind 20% of 0.0588 tonne of Dec. 1998 contract .	Unwind 40% of 0.0588 tonne of Dec. 1998 contract .	Unwind 40% of 0.0588 tonne of Dec. 1998 contract .
Nov-98		35.294	Unwind 20% of 0.0588 tonne of Dec 98 contract.	Unwind 40% of 0.0588 tonne of Dec 98 contract.	Unwind 40% of 0.0588 tonne of Dec 98 contract.
Dec-98		41.176	Unwind 20% of 0.0588 tonne of March 1999 contract	Unwind 40% of 0.0588 tonne of March 1999 contract	Unwind 40% of 0.0588 tonne of March 1999 contract
Jan-99		47.058	Unwind 20% of 0.0588 tonne of Mar 1999 contract.	Unwind 40% of 0.0588 tonne of Mar 1999 contract.	Unwind 40% of 0.0588 tonne of Mar 1999 contract.
Feb-99		52.941	Unwind 20% of 0.0588 tonne of Mar 1999 contract . (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 20% of 0.17647 tonne and short 20% of 0.117647 tonne using May 1999 contract	Unwind 40% of 0.0588 tonne of Mar 1999 contract . (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 40% of 0.17647 tonne and short 40% of 0.117647 tonne using May 1999 contract	Unwind 40% of 0.0588 tonne of Mar 1999 contract . (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 40% of 0.17647 tonne and short 40% of 0.117647 tonne using May 1999 contract
Mar-99	EPR announced	58.823	Unwind 20% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 20% of 0.117647 tonne and short 20% of 0.058823 tonne using May 1999 contract	Unwind 40% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 40% of 0.117647 tonne and short 40% of 0.058823 tonne using May 1999 contract	Unwind 40% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind 40% of 0.117647 tonne and short 40% of 0.058823 tonne using May 1999 contract

Date (Contract Months are in bold)	Monthly Activity	% Projected Sales (Cumulative)	Suggested risk management strategies using divisible Futures Contracts		
			CBOT (20%)	**KCBT (40%)**	**MGE (40%)**
Apr-99		64.705	Unwind 20% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind (the remaining) 20% of 0.058823 tonne.)	Unwind 40% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind (the remaining) 40% of 0.058823 tonne.)	Unwind 40% of 0.0588 tonne of May 1999 contract. (If May 1999 was unavailable in March 1998 and March 1999 was used to roll over contracts to hedge March & April 1999, then unwind (the remaining) 40% of 0.058823 tonne.)
May-99		70.588	Unwind 20% of 0.0588 tonne of July 1999 contract.	Unwind 40% of 0.0588 tonne of July 1999 contract.	Unwind 40% of 0.0588 tonne of July 1999 contract.
Jun-99		76.470	Unwind 20% of 0.0588 tonne of July 99 contract .	Unwind 40% of 0.0588 tonne of July 99 contract .	Unwind 40% of 0.0588 tonne of July 99 contract .
Jul-99	1998/99 Crop Year Ends. No more EPCO contracts	82.352	Unwind 20% of 0.0588 tonne of September 1999 contract.	Unwind 40% of 0.0588 tonne of September 1999 contract.	Unwind 40% of 0.0588 tonne of September 1999 contract.
Aug-99		88.235	Unwind 20% of 0.0588 tonne of October 1999 contract.	Unwind 40% of 0.0588 tonne of October 1999 contract.	Unwind 40% of 0.0588 tonne of October 1999 contract.
Sep-99		94.117	Unwind 20% of 0.058823 tonne of December 1999 contract.	Unwind 40% of 0.058823 tonne of December 1999 contract.	Unwind 40% of 0.058823 tonne of December 1999 contract.
Oct-99	Last CWB Sale on 98/99 Pool?	100			
Nov-99					
Dec-99					
Jan-00	Final Payment for 98/99 Crop				

Table A2. Description of Hedging Program for Early Pool Cash Out Contract

Date	Activity	% Projected Sales (Cumulative)	Suggested risk management strategies using divisible Futures Contracts		
			CBOT (20%)	**KCBT (40%)**	**MGE (40%)**
Mar 11 1998					
Apr-98					
May-98					
Jun-98		5.8824			
Jul-98	Initial Payment announced towards end of month.	11.7647			
Aug-98	1998/99 Crop Year Begins. Farmers sign EPCO contracts with CWB. Only a portion of this contract needs to be hedged against price risks since other portion already priced by existing sales.	17.6471	Assume contract signed in Aug 98 for Sep 98 delivery. Then 82.353% of projected sales yet to be made. Hence only 82.353% of risks need to be hedged. Short 20% of 0.17647 tonne on Dec 1998 futures to cover Sep, Oct, and Nov; short 20% of 0.17647 tonne on Mar 99 contract to cover Dec, Jan & Feb 99; short 20% of 0.11764 tonne on May 99 contract to cover Mar & April; short 20% of 0.11764 tonne on July 99 futures contracts to cover May & June; short 20% of 0.11764 tonne on Sep 99 contract to cover July & August; short 20% of 0.11764 tonne on Dec 99 cover Sep & Oct 99.	Assume contract signed in Aug 98 for Sep 98 delivery. Then 82.353% of projected sales yet to be made. Hence only 82.353% of risks need to be hedged. Short 40% of 0.17647 tonne on Dec 1998 futures to cover Sep, Oct, and Nov; short 40% of 0.17647 tonne on Mar 99 contract to cover Dec, Jan & Feb 99; short 40% of 0.11764 tonne on May 99 contract to cover Mar & April; short 40% of 0.11764 tonne on July 99 futures contracts to cover May & June; short 40% of 0.11764 tonne on Sep 99 contract to cover July & Aug; short 40% of 0.11764 tonne on Dec 99 cover Sep & Oct 99.	Assume contract signed in Aug 98 for September 98 delivery. Then 82.353% of projected sales yet to be made. Hence only 82.353% of risks need to be hedged. Short 40% of 0.17647 tonne on Dec 1998 futures to cover Sep, Oct, and Nov; short 40% of 0.17647 tonne on Mar 99 contract to cover Dec, Jan & Feb 99; short 40% of 0.11764 tonne on May 99 contract to cover Mar & April; short 40% of 0.11764 tonne on July 99 futures contracts to cover May & June; short 40% of 0.11764 tonne on Sep 99 contract to cover July & Aug; short 40% of 0.11764 tonne on Dec 99 cover Sep & Oct 99.
Sep-98		23.5294	Unwind 20% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract
Oct-98		29.4118	Unwind 20% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract

Date	Activity	% Projected Sales (Cumulative)	Suggested risk management strategies using divisible Futures Contracts		
			CBOT (20%)	**KCBT (40%)**	**MGE (40%)**
Nov-98		35.2941	Unwind 20% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract	Unwind 40% of 0.0588 tonne off Dec. 98 contract
Dec-98		41.1765	Unwind 20% of 0.0588 tonne of March 1999 contract.	Unwind 40% of 0.0588 tonne of March 1999 contract.	Unwind 40% of 0.0588 tonne of March 1999 contract.
Jan-99		47.0588	Unwind 20% of 0.0588 tonne off Mar. 99 contract.	Unwind 40% of 0.0588 tonne off Mar. 99 contract.	Unwind 40% of 0.0588 tonne off Mar. 99 contract.
Feb-99		52.9412	Unwind 20% of 0.0588 tonne off Mar. 99 contract.	Unwind 40% of 0.0588 tonne off Mar. 99 contract.	Unwind 40% of 0.0588 tonne off Mar. 99 contract.
Mar-99	EPR announced	58.8235	Unwind 20% of 0.0588 tonne off May 99 contract.	Unwind 40% of 0.0588 tonne off May 99 contract.	Unwind 40% of 0.0588 tonne off May 99 contract.
Apr-99		64.7059	Unwind 20% of 0.0588 tonne off May 99 contract.	Unwind 40% of 0.0588 tonne off May 99 contract.	Unwind 40% of 0.0588 tonne off May 99 contract.
May-99		70.5882	Unwind 20% of 0.0588 tonne off July 1999 contract.	Unwind 40% of 0.0588 tonne off July 1999 contract.	Unwind 40% of 0.0588 tonne off July 1999 contract.
Jun-99		76.4706	Unwind 20% of 0.0588 tonne off July 99 contract.	Unwind 40% of 0.0588 tonne off July 99 contract.	Unwind 40% of 0.0588 tonne off July 99 contract.
Jul-99	1998/99 Crop Year Ends. No more signing of EPCO contracts	82.3529	Unwind 20% of 0.0588 tonne off September 99 contract.	Unwind 40% of 0.0588 tonne off September 99 contract.	Unwind 40% of 0.0588 tonne off September 99 contract.
Aug-99		88.2353	Unwind 20% of 0.0588 tonne off Sep 99 contract.	Unwind 40% of 0.0588 tonne off Sep 99 contract.	Unwind 40% of 0.0588 tonne off Sep 99 contract.
Sep-99		94.1176	Unwind 20% of 0.0588 tonne off Dec 99 contract.	Unwind 40% of 0.0588 tonne off Dec 99 contract.	Unwind 40% of 0.0588 tonne off Dec 99 contract.
Oct-99	Last CWB Sale on 98/99 Pool?	100.00	Unwind 20% of 0.0588 tonne off Dec 99 contract.	Unwind 40% of 0.0588 tonne off Dec 99 contract.	Unwind 40% of 0.0588 tonne off Dec 99 contract.
Nov-99					
Dec-99					
Jan-00	Final Payment for 98/99 Crop				

9.1 Explanation of Appendix Tables A3-A26 and Verification of Results

Table A3 shows the hedge values over the period 1993-1997 using Scenario 1, the base case (Tables 2 and 3 in main text). The results show that if hedges are lifted monthly as the CWB makes cash sales, (i.e., on the last Wednesday in the months prior to the expiration month), the hedge position will lose $3.14 per tonne, $8.62 per tonne and $11.49 from trading on the CBOT, KCBT and MGE respectively for the 1993/94 crop year. The wheat hedge position will therefore be a loss of $23.24 per tonne. The currency hedge position over the same period, using the value of the short positions on the exchanges, produces losses of $1.77 per tonne based on the CBOT wheat futures trade, $4.08 per tonne based on the KCBT wheat futures trade and $4.85 per tonne based on the on the MGE wheat futures trade, for a total currency hedge loss of $10.70 for the 1993/94 crop year. Hence the net hedge position will be a loss of $33.94 per tonne for the 1993/94 crop year. However, if hedges are lifted weekly, i.e., every Wednesday, the hedge position from trading on the CBOT, KCBT and MGE will result in wheat hedge losses of $2.69, $8.46 and $10.64 respectively for 1993/94 crop year, a total loss of $21.79 per tonne. The corresponding currency hedge losses are $1.75 per tonne, $4.80 per tonne, and $4.73 per tonne from the CBOT, KCBT and MGE trades respectively, producing a total currency hedge loss of $11.28 per tonne. The net wheat and currency hedge position will be a loss of $33.07 per tonne. The net cash position, which is the final payment minus the FPC price calculated with 25% discount of the PRO, for the 1993/94 crop year is $30.4 dollars. Hence the net cash plus hedge position for the monthly offsetting scenario is a loss of 3.54 and that of the weekly offsetting scenario is a loss of $2.67. The net cash position using the FPC obtained from discounting the PRO by 15% is $29.04. Hence, combining this value with the net hedge positions results in net cash plus hedge losses of -$4.90 and -$4.03 for the monthly and weekly offsetting scenarios respectively.

One consistent result that runs through these Tables is that the wheat hedge values for 1996/97 and 1997/98 are positive, contrary to those of the other years. To help explain these hedge values, graphs[12] of the nearby futures contracts trading on the 3 exchanges for the 4 years over the period of the crop years (Figures 2-5), as well as the nearby futures trading on the IMM (Figures 6-9) are included. These graphs, *inter alia*, roughly depict the direction of hedge results. For example, the trend of the 1993/94 nearby futures for the

[12] There are no graphs of nearby futures for the 1997/98 crop years.

1993/94 crop year for all 3 exchanges is upward sloping. This explains the negative hedge values for the year 1993 (see Fig 2) since futures are sold first and later on bought back. The USD/CAD nearby futures, on the other hand, for the most part is downward sloping (Figure 6). The currency futures contract is bought first at a higher price and sold later, at various stages, at prices that are lower than the buying price. Hence the currency hedge produces a loss which adds to the loss on the wheat hedge for the 1993/94 crop year. These conclusions agree with the results reported from the historical simulations.

The nearby futures graph for 1994/95 is also upward sloping (see Fig. 3). However, the gradient appears to be steeper than that of the 1993/94 crop year. Hence the negative hedge values for 1994/95 are greater than those of 1993/94. On the other hand, the USD:CAD nearby futures for the 1994/95 crop year is undulating (Figure 7) and appears to have a slight upward slope. The currency hedge position is therefore positive, thereby reducing the net wheat plus currency hedge position slightly.

The hedge values for 1995/96 are also negative for the same reasons as above (see Fig. 4). The wheat nearby futures graph is upward sloping, thereby producing negative hedge values, the total hedge values for both the monthly and weekly offsetting cases. However, the negative wheat hedge position is offset, albeit slightly, by a positive currency hedge position resulting from a generally upward slope of the nearby currency futures graph (Figure 8). On the contrary, the slope of the nearby wheat futures for the 1996/97 crop year has been downward sloping. Hence the positive wheat hedge values for this crop year. The slope of the currency nearby futures during the 1996/97 crop year has a gentle positive slope (Figure 9). This produces a negative currency hedge position that slightly offsets the positive wheat hedge results. On the whole, the profits/losses from the currency hedge positions are less than the profits/losses from the wheat hedge positions.

Table A3. Scenario 1 (Unequal distribution of CWB sales with 20:40:40 trading on CBOT,KCBT and MGE respectively) FPC Values with Equal Farm Participation in contract months

1993/94 Crop Year

Wheat				Net Wheat Hedge Position	Currency				Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.14	-8.62	-11.49	-23.24		-1.77	-4.08	-4.85	-10.70	-33.94	30.4	-3.54	29.04	-4.90
Weekly					*Weekly*									
	-2.69	-8.46	-10.64	-21.79		-1.75	-4.80	-4.73	-11.28	-33.07		-2.67		-4.03

1994/95 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-7.24	-19.86	-16.27	-43.36		0.64	1.31	1.17	3.12	-40.24	59.68	19.44	58.09	17.85
Weekly					*Weekly*									
	-5.71	-15.95	-13.16	-34.82		0.61	1.21	1.00	2.82	-32.00		27.68		26.09

1995/96 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-10.91	-29.75	-27.66	-68.31		1.01	2.58	2.70	6.29	-62.02	72.24	10.22	70.11	8.09
Weekly					*Weekly*									
	-10.91	-29.26	-24.89	-65.05		1.03	2.65	2.84	6.52	-58.53		13.71		11.58

1996/97 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	11.06	22.64	22.65	56.36		-0.25	-0.55	-0.81	-1.62	54.74	-51.62	3.12	-54.2	0.54
Weekly					*Weekly*									
	9.88	21.88	23.61	55.37		-0.13	-0.28	-0.47	-0.88	54.49		2.87		0.29

1997/98 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	7.60	15.88	9.06	32.54		-2.69	-6.71	-7.27	-16.67	15.87	9.66	25.53	8.3	24.17
Weekly					*Weekly*									
	6.30	14.00	7.82	28.12		-2.36	-6.05	-6.65	-15.06	13.06		22.72		21.36

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A4. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) FPC Values with Equal Farm Participation in contract months

1993/94 Crop Year

Wheat				Net Wheat Hedge Position	Currency				Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-1.57	-3.22	-21.47	-26.26		-0.88	-1.80	-9.06	-11.74	-38.00	30.4	-7.60	29.04	-8.96
Weekly					*Weekly*									
	-1.35	-3.17	-19.95	-24.47		-0.87	-1.80	-8.87	-11.54	-36.01		-5.61		-6.97

1994/95 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.62	-7.45	-30.50	-41.56		0.32	0.49	2.19	3.00	-38.56	59.68	21.12	58.09	19.53
Weekly					*Weekly*									
	-2.86	-5.98	-24.50	-33.33		0.30	0.45	1.87	2.63	-30.70		28.98		27.39

1995/96 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-5.45	-11.15	-51.86	-68.47		0.51	0.98	5.14	6.63	-61.84	72.24	10.40	70.11	8.27
Weekly					*Weekly*									
	-5.45	-10.97	-46.66	-63.09		0.51	0.99	5.33	6.84	-56.25		15.99		13.86

1996/97 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	5.53	8.49	42.47	56.49		-0.13	-0.21	-1.52	-1.86	54.64	-51.62	3.02	-54.2	0.44
Weekly					*Weekly*									
	4.94	8.20	44.28	57.42		-0.06	-0.10	-0.88	-1.05	56.37		4.75		2.17

1997/98 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	3.80	5.96	16.98	26.73		-1.34	-2.52	-13.63	-17.49	9.25	9.66	18.91	8.3	17.55
Weekly					*Weekly*									
	3.15	5.25	14.67	23.07		-1.18	-2.29	-12.47	-15.93	7.14		16.80		15.44

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A5. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) FPC Values with Equal Farm Participation in contract months

1993/94 Crop Year

Wheat				Net Wheat Hedge Position	Currency				Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.14	-8.83	-11.44	-23.41		-2.18	-6.15	-6.22	-14.56	-37.97	30.4	-7.57	29.04	-8.93
Weekly					*Weekly*									
	-2.52	-8.92	-10.67	-22.12		-2.19	-6.19	-6.10	-14.47	-36.59		-6.19		-7.55

1994/95 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-8.49	-23.55	-19.11	-51.15		0.82	1.68	1.47	3.97	-47.18	59.68	12.50	58.09	10.91
Weekly					*Weekly*									
	-6.17	-17.85	-14.32	-38.35		0.76	1.51	1.22	3.49	-34.86		24.82		23.23

1995/96 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-9.92	-29.17	-27.88	-66.97		1.21	4.06	3.38	8.65	-58.32	72.24	13.92	70.11	11.79
Weekly					*Weekly*									
	-10.35	-29.03	-24.48	-63.86		1.18	3.19	3.45	7.83	-56.04		16.20		14.07

1996/97 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	10.51	21.73	21.14	53.38		-0.50	-1.06	-1.36	-2.92	50.46	-51.62	-1.16	-54.2	-3.74
Weekly					*Weekly*									
	9.05	20.44	21.99	51.47		-0.34	-0.68	-0.94	-1.97	49.50		-2.12		-4.70

1997/98 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	8.67	18.23	10.92	37.82		-3.43	-8.72	-9.53	-21.69	16.13	9.66	25.79	8.3	24.43
Weekly					*Weekly*									
	7.23	15.96	9.36	32.55		-3.04	-8.00	-8.79	-19.83	12.72		22.38		21.02

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A6. Scenario 4 (Equal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) FPC Values with Equal Farm Participation in contract months

1993/94 Crop Year

Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - FPC1*)**	**Net Cash + Hedge Position (FPC1*)**	**Net Cash Position (Final Payment - FPC2*)**	**Net Cash + Hedge Position (FPC2*)**
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-1.57	-3.31	-21.45	-26.34		-1.09	-2.31	-11.67	-15.07	-41.40	30.4	-11.00	29.04	-12.36
Weekly					*Weekly*									
	-1.26	-3.35	-20.00	-24.61		-1.09	-2.32	-11.44	-14.85	-39.46		-9.06		-10.42

1994/95 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-4.25	-8.83	-35.83	-48.90		0.41	2.76	3.80	6.96	-41.94	59.68	17.74	58.09	16.15
Weekly					*Weekly*									
	-3.09	-6.70	-26.84	-36.63		0.38	0.57	2.28	3.23	-33.40		26.28		24.69

1995/96 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-4.96	-10.94	-52.27	-68.17		0.61	1.21	6.34	8.16	-60.01	72.24	12.23	70.11	10.10
Weekly					*Weekly*									
	-5.18	-10.89	-45.91	-61.97		0.59	1.20	6.47	8.26	-53.71		18.53		16.40

1996/97 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	5.25	8.15	39.40	52.80		-0.26	-0.42	-2.74	-3.42	49.38	-51.62	-2.24	-54.2	-4.82
Weekly					*Weekly*									
	4.53	7.68	41.30	53.51		-0.17	-0.27	-1.90	-2.34	51.17		-0.45		-3.03

1997/98 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	4.34	6.83	20.47	31.64		-1.72	-3.27	-17.87	-22.86	8.78	9.66	18.44	8.3	17.08
Weekly					*Weekly*									
	3.62	5.98	17.56	27.16		-1.52	-3.00	-16.48	-21.00	6.16		15.82		14.46

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A7. Scenario 1 (Unequal distribution of CWB CWB sales with 20:40:40 trading on CBOT,KCBT and MGE respectively) FPC Values with Increasing Farm Participation in contract months

1993/94 Crop Year

Wheat				Net Wheat Hedge Position	Currency				Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.52	-8.89	-12.82	-25.24		-1.63	-4.22	-4.20	-10.05	-35.29	31.64	-3.65	30.35	-4.94
Weekly					*Weekly*									
	-2.94	-8.70	-11.28	-22.92		-1.61	-4.25	-4.14	-10.00	-32.92		-1.28		-2.57

1994/95 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-7.12	-18.88	-15.56	-41.56		0.78	1.65	1.53	3.96	-37.61	59.11	21.50	57.5	19.89
Weekly					*Weekly*									
	-5.52	-15.02	-12.35	-32.89		0.74	1.46	1.39	3.59	-29.30		29.81		28.20

1995/96 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-10.65	-27.49	-25.28	-63.42		0.69	1.62	1.72	4.03	-59.39	68.62	9.23	66.56	7.17
Weekly					*Weekly*									
	-10.05	-27.53	-23.21	-60.78		0.70	1.72	1.85	4.27	-56.51		12.11		10.05

1996/97 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	12.21	25.89	26.77	64.86		-0.27	-0.55	-0.84	-1.65	63.21	-58.14	5.07	-60.73	2.48
Weekly					*Weekly*									
	10.66	24.92	27.18	62.76		-0.15	-0.34	-0.56	-1.06	61.71		3.57		0.98

1997/98 Crop Year

Wheat					Currency									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	7.32	15.02	8.09	30.43		-2.59	-6.44	-6.86	-15.89	14.54	8.17	22.71	6.84	21.38
Weekly					*Weekly*									
	5.76	13.18	6.91	25.85		-2.25	-5.73	-6.26	-14.24	11.62		19.79		18.46

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A8. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT,KCBT and MGE respectively) FPC Values with Increasing Farm Participation in contract months

1993/94 Crop Year

Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - FPC1*)**	**Net Cash + Hedge Position (FPC1*)**	**Net Cash Position (Final Payment - FPC2*)**	**Net Cash + Hedge Position (FPC2*)**
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-1.76	-3.33	-24.04	-29.14		-0.84	-1.58	-7.87	-10.29	-39.42	31.64	-7.78	30.35	-9.07
Weekly					*Weekly*									
	-1.47	-3.26	-21.16	-25.89		-0.80	-1.59	-7.76	-10.16	-36.05		-4.41		-5.70

1994/95 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.61	-7.08	-29.18	-39.87		0.39	0.62	2.87	3.88	-35.99	59.11	23.12	57.5	21.51
Weekly					*Weekly*									
	-2.84	-5.79	-23.22	-31.86		0.37	0.55	2.60	3.52	-28.34		30.77		29.16

1995/96 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-5.32	-10.31	-47.40	-63.03		0.34	0.61	3.22	4.17	-58.86	68.62	9.76	66.56	7.70
Weekly					*Weekly*									
	-5.02	-10.32	-43.51	-58.86		0.35	0.64	3.47	4.47	-54.39		14.23		12.17

1996/97 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	6.10	9.71	50.19	66.00		-0.13	-0.21	-1.57	-1.91	64.09	-58.14	5.95	-60.73	3.36
Weekly					*Weekly*									
	5.33	9.35	50.96	65.64		-0.08	-0.04	-1.05	-1.17	64.47		6.33		3.74

1997/98 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	3.66	5.63	15.17	24.47		-1.29	-2.42	-12.87	-16.58	7.89	8.17	16.06	6.84	14.73
Weekly					*Weekly*									
	2.88	4.94	12.96	20.79		-1.12	-2.16	-11.73	-15.01	5.78		13.95		12.62

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A9. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) FPC Values with Increasing Farm Participation in contract months

1993/94 Crop Year

Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - FPC1*)**	**Net Cash + Hedge Position (FPC1*)**	**Net Cash Position (Final Payment - FPC2*)**	**Net Cash + Hedge Position (FPC2*)**
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-3.53	-9.12	-13.09	-25.74		-2.02	-5.40	-5.37	-12.78	-38.52	31.64	-6.88	30.35	-8.17
Weekly					*Weekly*									
	-2.75	-9.12	-11.33	-23.21		-2.02	-5.45	-5.31	-12.78	-35.99		-4.35		-5.64

1994/95 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-8.63	-22.44	-18.38	-49.45		0.96	2.06	1.89	4.92	-44.53	59.11	14.58	57.5	12.97
Weekly					*Weekly*									
	-6.05	-16.81	-13.56	-36.42		0.90	1.77	1.67	4.34	-32.08		27.03		25.42

1995/96 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-9.89	-26.38	-25.11	-61.39		0.80	2.95	2.08	5.83	-55.56	68.62	13.06	66.56	11.00
Weekly					*Weekly*									
	-9.52	-27.03	-22.70	-59.25		0.76	1.96	2.13	4.85	-54.40		14.22		12.16

1996/97 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	11.69	25.43	25.42	62.54		-0.54	-1.12	-1.53	-3.19	59.35	-58.14	1.21	-60.73	-1.38
Weekly					*Weekly*									
	9.81	23.90	25.79	59.50		-0.37	-0.81	-1.13	-2.31	57.19		-0.95		-3.54

1997/98 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	8.50	17.20	9.90	35.60		-3.32	-8.41	-9.02	-20.75	14.85	8.17	23.02	6.84	21.69
Weekly					*Weekly*									
	6.67	15.00	8.42	30.09		-2.92	-7.57	-8.29	-18.78	11.32		19.49		18.16

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A10. Scenario 4 (Equal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) FPC Values with Increasing Farm Participation in contract months

1993/94 Crop Year

Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - FPC1*)**	**Net Cash + Hedge Position (FPC1*)**	**Net Cash Position (Final Payment - FPC2*)**	**Net Cash + Hedge Position (FPC2*)**
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-1.77	-3.42	-24.55	-29.73		-1.01	-2.02	-10.07	-13.10	-42.83	31.64	-11.19	30.35	-12.48
Weekly					*Weekly*									
	-1.17	-3.20	-19.09	-23.46		-1.01	-2.04	-9.96	-13.02	-36.48		-4.84		-6.13

1994/95 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-4.31	-8.42	-34.46	-47.19		0.48	0.77	3.55	4.80	-42.38	59.11	16.73	57.5	15.12
Weekly					*Weekly*									
	-3.03	-6.30	-25.43	-34.76		0.45	0.66	3.14	4.25	-30.51		28.60		26.99

1995/96 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	-4.95	-9.89	-47.08	-61.92		0.40	0.73	3.90	5.03	-56.89	68.62	11.73	66.56	9.67
Weekly					*Weekly*									
	-4.76	-10.13	-42.56	-57.46		0.38	0.73	3.99	5.10	-52.35		16.27		14.21

1996/97 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	5.85	9.54	47.66	63.04		-0.27	-0.42	-2.87	-3.55	59.49	-58.14	1.35	-60.73	-1.24
Weekly					*Weekly*									
	4.91	8.90	48.35	62.16		-0.19	-0.30	-2.12	-2.61	59.55		1.41		-1.18

1997/98 Crop Year

Wheat					**Currency**									
Monthly					*Monthly*									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
	4.25	6.45	18.57	29.27		-1.66	-3.15	-16.92	-21.73	7.54	8.17	15.71	6.84	14.38
Weekly					*Weekly*									
	3.33	5.63	15.79	24.75		-1.46	-2.84	-15.55	-19.84	4.91		13.08		11.75

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A11. Scenario 1 (Unequal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) FPC Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-2.79	-8.39	-10.97	-22.14	*Monthly*	-1.89	-5.24	-5.35	-12.48	-34.62	29.15	-5.47	27.74	-6.88
Weekly	-2.42	-8.23	-10.26	-20.91	*Weekly*	-1.89	-5.27	-5.33	-12.49	-33.40		-4.25		-5.66
1994/95 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-7.16	-20.84	-16.97	-44.97	*Monthly*	0.47	0.93	0.79	2.19	-42.78	60.24	17.46	58.68	15.90
Weekly	-5.98	-16.89	-13.78	-36.64	*Weekly*	0.44	0.79	0.61	1.84	-34.81		25.43		23.87
1995/96 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-11.16	-32.00	-30.04	-73.20	*Monthly*	1.32	3.54	3.68	8.55	-64.65	75.85	11.20	73.66	9.01
Weekly	-11.77	-30.99	-26.57	-69.32	*Weekly*	1.35	3.58	3.83	8.77	-60.56		15.29		13.10
1996/97 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	9.96	19.36	18.75	48.08	*Monthly*	-0.20	-0.45	-0.56	-1.21	46.87	-45.11	1.76	-47.67	-0.80
Weekly	9.05	18.72	19.95	47.72	*Weekly*	-0.10	-0.15	-0.24	-0.49	47.23		2.12		-0.44
1997/98 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE		*Monthly*	CBOT	KCBT	MGE						
Monthly	7.87	16.75	10.02	34.64		-2.79	-6.97	-7.68	-17.44	17.20	11.16	28.36	9.76	26.96
Weekly	6.84	14.81	8.73	30.39	*Weekly*	-2.47	-6.37	-7.05	-15.88	14.51		25.67		24.27

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A12. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) FPC Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-1.39	-3.15	-20.56	-25.10	*Monthly*	-1.02	-1.97	-10.03	-13.02	-38.12	29.15	-8.97	27.74	-10.38
Weekly	-1.21	-3.09	-19.23	-23.53	*Weekly*	-0.95	-1.98	-9.98	-12.91	-36.44		-7.29		-8.70
1994/95 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-3.66	-7.81	-31.82	-43.29	*Monthly*	0.24	0.35	1.50	2.09	-41.20	60.24	19.04	58.68	17.48
Weekly	-3.05	-6.43	-25.88	-35.36	*Weekly*	0.22	0.29	1.14	1.66	-33.70		26.54		24.98
1995/96 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-5.58	-12.00	-56.33	-73.91	*Monthly*	0.66	1.33	6.91	8.90	-65.01	75.85	10.84	73.64	8.63
Weekly	-5.88	-11.62	-49.81	-67.32	*Weekly*	0.68	1.34	7.19	9.21	-58.11		17.74		15.53
1996/97 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	4.98	7.26	35.16	47.40	*Monthly*	-0.10	-0.17	-1.05	-1.32	46.08	-45.11	0.97	-47.67	-1.59
Weekly	4.53	7.02	37.41	48.95	*Weekly*	-0.05	-0.03	-0.45	-0.54	48.42		3.31		0.75
1997/98 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE		*Monthly*	CBOT	KCBT	MGE						
Monthly	3.94	6.28	18.79	29.00		-1.40	-2.61	-14.39	-18.40	10.60	11.16	21.76	9.76	20.36
Weekly	3.42	5.56	16.38	25.35	*Weekly*	-1.23	-2.42	-13.21	-16.86	8.49		19.65		18.25

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A13. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) FPC Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - FPC1*)	Net Cash + Hedge Position (FPC1*)	Net Cash Position (Final Payment - FPC2*)	Net Cash + Hedge Position (FPC2*)
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-2.79	-8.69	-10.98	-22.47	*Monthly*	-2.33	-6.74	-6.91	-15.98	-38.45	29.15	-9.30	27.74	-10.71
Weekly	-2.28	-8.73	-10.35	-21.36	*Weekly*	-2.36	-6.80	-6.89	-16.05	-37.41		-8.26		-9.67
1994/95 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-8.47	-24.66	-19.84	-52.97	*Monthly*	0.62	1.24	1.05	2.90	-50.07	60.24	10.17	58.68	8.61
Weekly	-6.44	-18.90	-15.07	-40.41	*Weekly*	0.56	0.99	0.76	2.31	-38.10		22.14		20.58
1995/96 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-9.94	-31.96	-30.66	-72.56	*Monthly*	1.62	5.16	4.69	11.47	-61.09	75.85	14.76	73.66	12.57
Weekly	-11.18	-31.04	-26.26	-68.48	*Weekly*	1.60	4.43	4.77	10.80	-57.68		18.17		15.98
1996/97 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	9.34	18.03	16.86	44.22	*Monthly*	-0.46	-1.00	-1.19	-2.65	41.57	-45.11	-3.54	-47.67	-6.10
Weekly	8.28	16.97	18.19	43.44	*Weekly*	-0.31	-0.56	-0.76	-1.63	41.82		-3.29		-5.85
1997/98 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	8.85	19.25	11.93	40.04	*Monthly*	-3.55	-9.03	-10.04	-22.63	17.41	11.16	28.57	9.76	27.17
Weekly	7.80	16.91	10.31	35.01	*Weekly*	-3.17	-8.43	-9.28	-20.89	14.13		25.29		23.89

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A14. Scenario 4 (Equal distribution of CWB sales with 10:15:75 trading on CBOT,KCBT and MGE respectively) FPC Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				**Net Wheat Hedge Position**					**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - FPC1*)**	**Net Cash + Hedge Position (FPC1*)**	**Net Cash Position (Final Payment - FPC2*)**	**Net Cash + Hedge Position (FPC2*)**
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-1.40	-3.26	-20.59	-25.25	*Monthly*	-1.16	-2.53	-12.96	-16.65	-41.89	29.15	-12.74	27.74	-14.15
Weekly	-1.00	-3.13	-17.97	-22.10	*Weekly*	-1.18	-2.55	-12.92	-16.65	-38.75		-9.60		-11.01
1994/95 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-4.24	-9.25	-37.20	-50.68	*Monthly*	0.31	0.46	1.96	2.73	-47.94	60.24	12.30	60.24	12.30
Weekly	-3.22	-7.09	-28.26	-38.57	*Weekly*	0.28	0.37	1.42	2.08	-36.49		23.75		23.75
1995/96 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	-4.97	-11.99	-57.48	-74.44	*Monthly*	0.81	1.69	8.79	11.29	-63.15	75.85	12.70	75.85	12.70
Weekly	-5.59	-11.64	-49.24	-66.47	*Weekly*	0.80	1.66	8.95	11.41	-55.06		20.79		20.79
1996/97 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	4.67	6.76	31.60	43.03	*Monthly*	-0.23	-0.38	-2.23	-2.83	40.20	-45.11	-4.91	-45.11	-4.91
Weekly	4.14	6.13	34.11	44.37	*Weekly*	-0.15	-0.21	-1.42	-1.78	42.59		-2.52		-2.52
1997/98 Crop Year														
Wheat					**Currency**									
	CBOT	KCBT	MGE			CBOT	KCBT	MGE						
Monthly	4.43	7.22	22.37	34.02	*Monthly*	-1.78	-3.39	-18.83	-23.99	10.03	11.16	21.19	9.76	19.79
Weekly	3.90	6.34	19.33	29.57	*Weekly*	-1.58	-3.16	-17.41	-22.15	7.42		18.58		17.18

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week
FPC1* = Partial PRO FPC (FPC obtained from discounting 25% of PRO)
FPC2* = Partial PRO FPC (FPC obtained from discounting 15% of PRO)

Table A15. Scenario 1 (Unequal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Equal Farm Participation in contract months

1993/94 Crop Year											
Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - (EPCO Initial+Adjustment Payment)**	**Net Cash + Hedge Position**
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.10	-2.81	-2.89	-6.80		-0.13	-0.27	-0.26	-0.66	-7.45	16.02	8.57
Weekly					*Weekly*							
	-1.08	-2.61	-2.43	-6.12		-0.14	-0.29	-0.28	-0.71	-6.83		9.19
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.75	-4.42	-3.97	-10.15		0.03	0.07	0.08	0.18	-9.97	14.33	4.36
Weekly					*Weekly*							
	-1.57	-3.82	-3.43	-8.82		0.04	0.08	0.09	0.21	-8.61		5.72
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.49	-4.47	-3.28	-9.24		0.06	0.16	0.16	0.39	-8.85	13.72	4.87
Weekly					*Weekly*							
	-1.37	-4.36	-3.08	-8.82		0.09	0.22	0.22	0.53	-8.28		5.44
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.52	-0.21	-0.56	-0.25		-0.14	-0.29	-0.31	-0.74	-0.98	-0.46	-1.44
Weekly					*Weekly*							
	0.54	-0.35	-0.40	-0.22		-0.10	-0.20	-0.22	-0.52	-0.74		-1.20
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	3.37	5.91	4.14	13.42		-0.69	-1.40	-1.47	-3.56	9.85	2.93	12.78
Weekly					*Weekly*							
	3.30	5.57	3.88	12.74		-0.62	-1.24	-1.30	-3.16	9.59		12.52

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A16. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Equal Farm Participation in Contract months

1993/94 Crop Year

Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - (EPCO Initial+Adjustmen Payment)**	**Net Cash + Hedge Position**
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.55	-1.05	-5.41	-7.02		-0.06	-0.10	-0.49	-0.65	-7.67	16.02	8.35
Weekly					*Weekly*							
	-0.54	-0.98	-4.56	-6.07		-0.07	-0.11	-0.53	-0.71	-6.78		9.24

1994/95 Crop Year

Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.88	-1.66	-7.45	-9.98		0.02	0.02	0.16	0.20	-9.79	14.33	4.54
Weekly					*Weekly*							
	-0.79	-1.43	-6.44	-8.65		0.02	0.03	0.18	0.23	-8.43		5.90

1995/96 Crop Year

Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.75	-1.68	-6.15	-8.57		0.03	0.06	0.31	0.40	-8.17	13.72	5.55
Weekly					*Weekly*							
	-0.69	-1.64	-5.78	-8.10		0.05	0.08	0.41	0.54	-7.55		6.17

1996/97 Crop Year

Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.26	-0.08	-1.05	-0.87		-0.07	-0.11	-0.58	-0.76	-1.62	-0.46	-2.08
Weekly					*Weekly*							
	0.27	-0.13	-0.75	-0.61		-0.05	-0.08	-0.42	-0.54	-1.15		-1.61

1997/98 Crop Year

Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	1.69	2.22	7.76	11.66		-0.35	-0.52	-2.76	-3.63	8.03	2.93	10.96
Weekly					*Weekly*							
	1.65	2.09	7.27	11.01		-0.31	-0.46	-2.44	-3.21	7.79		10.72

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A17. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Equal Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EPCO Initial+Adjustmen Payment)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.25	-3.32	-3.43	-8.00		-0.16	-0.32	-0.31	-0.78	-8.78	16.02	7.24
Weekly					*Weekly*							
	-1.20	-3.06	-2.87	-7.14		-0.18	-0.36	-0.35	-0.88	-8.02		8.00
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-2.75	-6.69	-6.18	-15.61		0.12	0.24	0.25	0.61	-15.00	14.33	-0.67
Weekly					*Weekly*							
	-2.43	-5.78	-5.31	-13.52		0.12	0.25	0.26	0.63	-12.89		1.44
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.50	-4.57	-3.38	-9.45		0.09	0.23	0.23	0.56	-8.88	13.72	4.84
Weekly					*Weekly*							
	-1.49	-4.79	-3.39	-9.66		0.11	0.26	0.26	0.62	-9.04		4.68
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.42	-0.18	-0.93	-0.69		-0.23	-0.47	-0.49	-1.19	-1.88	-0.46	-2.34
Weekly					*Weekly*							
	0.45	-0.36	-0.70	-0.61		-0.18	-0.36	-0.38	-0.92	-1.53		-1.99
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	4.29	7.41	5.23	16.92		-0.90	-1.82	-1.91	-4.63	12.29	2.93	15.22
Weekly					*Weekly*							
	4.17	7.04	4.92	16.12		-0.81	-1.64	-1.71	-4.16	11.97		14.90

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A18. Scenario 4 (equal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Equal Farm Participation in contract months

1993/94 Crop Year											
Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - (EPCO Initial+Adjustment Payment)**	**Net Cash + Hedge Position**
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.63	-1.25	-6.43	-8.30		-0.08	-0.12	-0.58	-0.78	-9.08	16.02	6.94
Weekly					*Weekly*							
	-0.60	-1.15	-5.39	-7.14		-0.09	-0.13	-0.66	-0.88	-8.02		8.00
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.37	-2.51	-11.58	-15.47		0.06	0.09	0.48	0.63	-14.84	14.33	-0.51
Weekly					*Weekly*							
	-1.22	-2.17	-9.96	-13.35		0.06	0.09	0.49	0.65	-12.70		1.63
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.75	-1.71	-6.34	-8.80		0.05	0.09	0.44	0.57	-8.22	13.72	5.50
Weekly					*Weekly*							
	-0.74	-1.80	-6.35	-8.89		0.05	0.10	0.48	0.63	-8.25		5.47
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.21	-0.07	-1.74	-1.60		-0.11	-0.18	-0.92	-1.21	-2.81	-0.46	-3.27
Weekly					*Weekly*							
	0.22	-0.14	-1.30	-1.22		-0.09	-0.14	-0.71	-0.93	-2.15		-2.61
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	2.14	2.78	9.81	14.73		-0.45	-0.68	-3.58	-4.71	10.01	2.93	12.94
Weekly					*Weekly*							
	2.09	2.64	9.22	13.94		-0.40	-0.61	-3.21	-4.23	9.71		12.64

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A19. Scenario 1 (Unequal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Increasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EPC Initial+Adjustn Payment)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.69	-1.84	-1.93	-4.45		-0.08	-0.16	-0.16	-0.40	-4.86	13.71	8.85
Weekly					*Weekly*							
	-0.67	-1.71	-1.61	-3.99		-0.09	-0.19	-0.19	-0.47	-4.46		9.25
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.76	-4.28	-4.00	-10.04		0.12	0.23	0.24	0.59	-9.45	12.25	2.80
Weekly					*Weekly*							
	-1.58	-3.75	-3.49	-8.81		0.12	0.24	0.25	0.61	-8.21		4.04
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.63	-1.92	-1.36	-3.91		0.06	0.13	0.13	0.31	-3.59	8.18	4.59
Weekly					*Weekly*							
	-0.63	-1.93	-1.27	-3.82		0.07	0.15	0.15	0.37	-3.46		4.72
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.23	-0.25	-0.71	-0.73		-0.14	-0.29	-0.30	-0.73	-1.47	2.55	1.08
Weekly					*Weekly*							
	0.22	-0.36	-0.56	-0.69		-0.11	-0.22	-0.23	-0.56	-1.25		1.30
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	2.51	4.32	3.16	9.99		-0.51	-1.05	-1.12	-2.68	7.30	4.52	11.82
Weekly					*Weekly*							
	2.42	4.09	2.95	9.46		-0.45	-0.93	-0.98	-2.36	7.09		11.61

Notes

Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A20. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Increasing Farm Participation in contract months

1993/94 Crop Year Wheat				Net Wheat Hedge Position	Currency				Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EPC Initial+Adjustn Payment)	Net Cash + Hedge Position
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.34	-0.69	-3.61	-4.65		-0.04	-0.06	-0.30	-0.40	-5.05	13.71	8.66
Weekly					*Weekly*							
	-0.33	-0.64	-3.02	-3.99		-0.05	-0.07	-0.35	-0.47	-4.46		9.25
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.88	-1.60	-7.50	-9.99		0.06	0.09	0.45	0.60	-9.39	12.25	2.86
Weekly					*Weekly*							
	-0.79	-1.40	-6.55	-8.74		0.06	0.09	0.47	0.62	-8.12		4.13
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.31	-0.72	-2.55	-3.59		0.03	0.05	0.24	0.32	-3.27	8.18	4.91
Weekly					*Weekly*							
	-0.31	-0.72	-2.38	-3.41		0.03	0.06	0.28	0.37	-3.04		5.14
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.11	-0.09	-1.34	-1.32		-0.07	-0.11	-0.57	-0.75	-2.06	2.55	0.49
Weekly					*Weekly*							
	0.11	-0.13	-1.04	-1.07		-0.05	-0.08	-0.43	-0.57	-1.63		0.92
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	1.25	1.62	5.92	8.80		-0.26	-0.39	-2.09	-2.74	6.05	4.52	10.57
Weekly					*Weekly*							
	1.21	1.53	5.52	8.27		-0.23	-0.35	-1.84	-2.42	5.85		10.37

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A21. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Increasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EP(Initial+Adjustn Payment)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.87	-2.41	-2.54	-5.82		-0.09	-0.19	-0.19	-0.47	-6.29	13.71	7.42
Weekly					*Weekly*							
	-0.82	-2.22	-2.11	-5.15		-0.11	-0.23	-0.23	-0.58	-5.73		7.98
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-2.67	-6.37	-6.06	-15.10		0.20	0.40	0.41	1.01	-14.09	12.25	-1.84
Weekly					*Weekly*							
	-2.37	-5.58	-5.28	-13.23		0.20	0.41	0.41	1.03	-12.20		0.05
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.50	-1.63	-1.11	-3.23		0.08	0.18	0.18	0.44	-2.80	8.18	5.38
Weekly					*Weekly*							
	-0.60	-1.87	-1.16	-3.63		0.08	0.18	0.18	0.44	-3.19		4.99
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.23	-0.15	-0.97	-0.90		-0.21	-0.43	-0.44	-1.08	-1.98	2.55	0.57
Weekly					*Weekly*							
	0.22	-0.30	-0.75	-0.83		-0.17	-0.34	-0.35	-0.86	-1.68		0.87
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	3.32	5.67	4.20	13.19		-0.70	-1.43	-1.52	-3.65	9.54	4.52	14.06
Weekly					*Weekly*							
	3.20	5.40	3.92	12.52		-0.62	-1.27	-1.35	-3.24	9.27		13.79

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A22. Scenario 4 (Equal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Increasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EPC Initial+Adjustn Payment)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.44	-0.90	-4.76	-6.10		-0.05	-0.07	-0.35	-0.47	-6.57	13.71	7.14
Weekly					*Weekly*							
	-0.41	-0.83	-3.96	-5.20		-0.06	-0.09	-0.43	-0.58	-5.78		7.93
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.33	-2.39	-11.37	-15.09		0.10	0.15	0.77	1.02	-14.07	12.25	-1.82
Weekly					*Weekly*							
	-1.19	-2.09	-9.90	-13.17		0.10	0.15	0.78	1.03	-12.14		0.11
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.25	-0.61	-2.08	-2.94		0.04	0.07	0.34	0.44	-2.49	8.18	5.69
Weekly					*Weekly*							
	-0.30	-0.70	-2.17	-3.17		0.04	0.07	0.34	0.45	-2.72		5.46
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.11	-0.06	-1.82	-1.76		-0.11	-0.16	-0.83	-1.10	-2.86	2.55	-0.31
Weekly					*Weekly*							
	0.11	-0.11	-1.40	-1.40		-0.08	-0.13	-0.66	-0.87	-2.27		0.28
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	1.66	2.13	7.87	11.66		-0.35	-0.54	-2.85	-3.73	7.92	4.52	12.44
Weekly					*Weekly*							
	1.60	2.02	7.35	10.97		-0.31	-0.48	-2.53	-3.31	7.66		12.18

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A23. Scenario 1 (Unequal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Pmt - (EPCO + Initial+Adj Pmt)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.52	-3.77	-3.85	-9.14		-0.18	-0.37	-0.36	-0.91	-10.05	18.33	8.28
Weekly					*Weekly*							
	-1.49	-3.50	-3.25	-8.24		-0.19	-0.39	-0.37	-0.95	-9.20		9.13
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.75	-4.56	-3.94	-10.26		-0.05	-0.10	-0.08	-0.23	-10.48	16.42	5.94
Weekly					*Weekly*							
	-1.57	-3.89	-3.38	-8.83		-0.04	-0.08	-0.06	-0.18	-9.01		7.41
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-2.36	-7.02	-5.20	-14.57		0.07	0.20	0.20	0.47	-14.10	19.26	5.16
Weekly					*Weekly*							
	-2.11	-6.80	-4.89	-13.81		0.12	0.29	0.29	0.70	-13.11		6.15
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.82	-0.18	-0.40	0.24		-0.14	-0.28	-0.32	-0.74	-0.50	-3.47	-3.97
Weekly					*Weekly*							
	0.85	-0.35	-0.24	0.26		-0.09	-0.18	-0.22	-0.49	-0.23		-3.70
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	4.24	7.49	5.12	16.85		-0.87	-1.75	-1.83	-4.45	12.40	1.33	13.73
Weekly					*Weekly*							
	4.17	7.05	4.81	16.03		-0.78	-1.55	-1.62	-3.95	12.08		13.41

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A24. Scenario 2 (Unequal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Decreasing Farm Participation in contract months

1993/94 Crop Year											
Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - (EPCO Initial+Adjustmen Payment)**	**Net Cash + Hedge Position**
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.76	-1.41	-7.22	-9.39		-0.09	-0.14	-0.67	-0.90	-10.29	18.33	8.04
Weekly					*Weekly*							
	-0.75	-1.31	-6.10	-8.15		-0.09	-0.15	-0.70	-0.94	-9.10		9.23
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.87	-1.71	-7.39	-9.98		-0.02	-0.04	-0.14	-0.21	-10.19	16.42	6.23
Weekly					*Weekly*							
	-0.78	-1.46	-6.33	-8.57		-0.02	-0.03	-0.11	-0.16	-8.73		7.69
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.18	-2.63	-9.74	-13.55		0.03	0.07	0.38	0.48	-13.07	19.26	6.19
Weekly					*Weekly*							
	-1.06	-2.55	-9.17	-12.78		0.06	0.11	0.55	0.72	-12.06		7.20
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.41	-0.07	-0.76	-0.42		-0.07	-0.11	-0.59	-0.77	-1.18	-3.47	-4.65
Weekly					*Weekly*							
	0.42	-0.13	-0.45	-0.16		-0.04	-0.07	-0.40	-0.52	-0.68		-4.15
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	2.12	2.81	9.60	14.53		-0.44	-0.66	-3.43	-4.52	10.01	1.33	11.34
Weekly					*Weekly*							
	2.09	2.64	9.02	13.74		-0.39	-0.58	-3.04	-4.01	9.73		11.06

Notes

Monthly = Hedge values from lifting wheat hedges once a month

Weekly = Hedge values from lifting hedges once a week

Table A25. Scenario 3 (Equal distribution of CWB sales with 20:40:40 trading on CBOT, KCBT and MGE respectively) EPCO Values with Decreasing Farm Participation in contract months

1993/94 Crop Year											
Wheat				**Net Wheat Hedge Position**	**Currency**				**Net Currency Hedge Position**	**Net Hedge Position**	**Net Cash Position (Final Payment - (EPCO Initial+Adjustmen Payment)**	**Net Cash + Hedge Position**
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.63	-4.23	-4.32	-10.18		-0.22	-0.44	-0.43	-1.10	-11.28	18.33	7.05
Weekly					*Weekly*							
	-1.58	-3.90	-3.64	-9.12		-0.24	-0.48	-0.47	-1.19	-10.31		8.02
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-2.83	-7.00	-6.29	-16.13		0.04	0.07	0.10	0.21	-15.92	16.42	0.50
Weekly					*Weekly*							
	-2.49	-5.98	-5.35	-13.82		0.04	0.08	0.11	0.24	-13.59		2.84
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-2.50	-7.51	-5.65	-15.66		0.11	0.29	0.29	0.68	-14.97	19.26	4.29
Weekly					*Weekly*							
	-2.37	-7.70	-5.61	-15.69		0.13	0.33	0.33	0.80	-14.89		4.37
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.61	-0.22	-0.89	-0.49		-0.25	-0.51	-0.54	-1.30	-1.79	-3.47	-5.26
Weekly					*Weekly*							
	0.68	-0.43	-0.64	-0.40		-0.19	-0.39	-0.41	-0.98	-1.38		-4.85
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	5.25	9.14	6.26	20.65		-1.10	-2.22	-2.30	-5.61	15.04	1.33	16.37
Weekly					*Weekly*							
	5.14	8.68	5.91	19.73		-0.99	-2.00	-2.08	-5.07	14.66		15.99

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A26. Scenario 4 (Equal distribution of CWB sales with 10:15:75 trading on CBOT, KCBT and MGE respectively) EPCO Values with Decreasing Farm Participation in contract months

1993/94 Crop Year				Net Wheat Hedge Position					Net Currency Hedge Position	Net Hedge Position	Net Cash Position (Final Payment - (EPCO Initial+Adjustmen Payment)	Net Cash + Hedge Position
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-0.82	-1.59	-8.10	-10.50		-0.11	-0.17	-0.81	-1.09	-11.59	18.33	6.74
Weekly					*Weekly*							
	-0.79	-1.46	-6.82	-9.08		-0.12	-0.18	-0.88	-1.18	-10.25		8.08
1994/95 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.42	-2.63	-11.80	-15.84		0.02	0.03	0.19	0.23	-15.61	16.42	0.81
Weekly					*Weekly*							
	-1.25	-2.24	-10.03	-13.52		0.02	0.03	0.20	0.26	-13.26		3.16
1995/96 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	-1.25	-2.81	-10.59	-14.66		0.05	0.11	0.54	0.71	-13.95	19.26	5.31
Weekly					*Weekly*							
	-1.19	-2.89	-10.52	-14.60		0.07	0.12	0.62	0.81	-13.78		5.48
1996/97 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	0.31	-0.08	-1.66	-1.44		-0.12	-0.19	-1.00	-1.32	-2.76	-3.47	-6.23
Weekly					*Weekly*							
	0.34	-0.16	-1.21	-1.03		-0.09	-0.14	-0.76	-1.00	-2.03		-5.50
1997/98 Crop Year												
Wheat					**Currency**							
Monthly					*Monthly*							
	CBOT	KCBT	MGE			CBOT	KCBT	MGE				
	2.62	3.43	11.75	17.80		-0.55	-0.83	-4.31	-5.69	12.11	1.33	13.44
Weekly					*Weekly*							
	2.57	3.25	11.09	16.91		-0.50	-0.75	-3.89	-5.14	11.77		13.10

Notes
Monthly = Hedge values from lifting wheat hedges once a month
Weekly = Hedge values from lifting hedges once a week

Table A27. Western Canadian Wheat CWB Quantity Receipts by Crop Year and Final Net Pool Value Per Tonne (Including Government Guarantees)

Crop YEAR	1 CWRS Tonnes	2 CWRS Tonnes	3 CWRS Tonnes	TOTAL Tonnes	1 CWRS Final Pool Value $/T	2 CWRS Final Pool Value $/T	3 CWRS Final Pool Value $/T
1975-76	2,882,970	4,286,059	2,031,555	9,200,584	146.27	141.42	132.78
1976-77	8,454,778	3,030,882	439,124	11,924,785	117.15	109.89	104.35
1977-78	7,432,993	1,759,451	3,183,950	12,376,393	120.3	113.81	107.17
1978-79	6,292,178	1,853,070	1,749,483	9,894,731	160.53	151.8	150.11
1979-80	7,406,366	2,986,198	2,677,458	13,070,022	196.43	187.64	179.18
1980-81	3,927,895	4,506,029	4,950,550	13,384,474	222.12	217.96	209.42
1981-82	10,630,755	3,580,319	1,559,625	15,770,699	199.62	197.03	187.76
1982-83	9,216,202	4,896,461	3,024,821	17,137,484	192.34	187.39	180.39
1983-84	11,522,103	3,371,000	3,230,046	18,123,149	193.98	190.23	178.56
1984-85	12,281,701	988,131	1,311,408	14,581,241	186.37	184.11	171.51
1985-86	3,197,975	3,729,669	4,486,528	11,414,172	160	154.21	146.21
1986-87	6,142,850	3,267,968	4,431,953	13,842,771	130	124.21	110.21
1987-88	4,855,577	6,680,442	3,101,605	14,637,625	134.02	127.87	115.78
1988-89	8,189,247	4,029,452	1,337,637	13,556,336	197.14	191.19	182.11
1989-90	6,495,428	4,526,378	4,968,945	15,990,751	172.11	168.08	161.13
1990-91	18,215,797	2,684,989	330,850	21,231,637	135	129.21	117.21
1991-92	16,240,700	1,265,253	386,389	17,892,342	134.14	127.22	122.67
1992-93	6,130,247	3,209,249	5,420,511	14,760,007	156.82	149.99	145.19
1993-94	2,349,618	5,101,435	4,055,697	11,506,750	164.01	155.46	142.82
1994-95	7,071,758	3,839,480	1,329,115	12,240,353	195.59	189.45	180.11
1995-96	8,493,288	2,937,650	682,081	12,113,018	254.16	251.17	247.6
mean	7,972,877	3,453,789	2,604,254	14,030,920	170	164	156
standard deviation	3,983,185	1,316,349	1,613,883	2,849,786	35	36	36

Source : Unterschultz and Novak (1997)

10 APPENDIX 2. Figures

Figure 1. General Timeline for FPC and EPCO Contracts

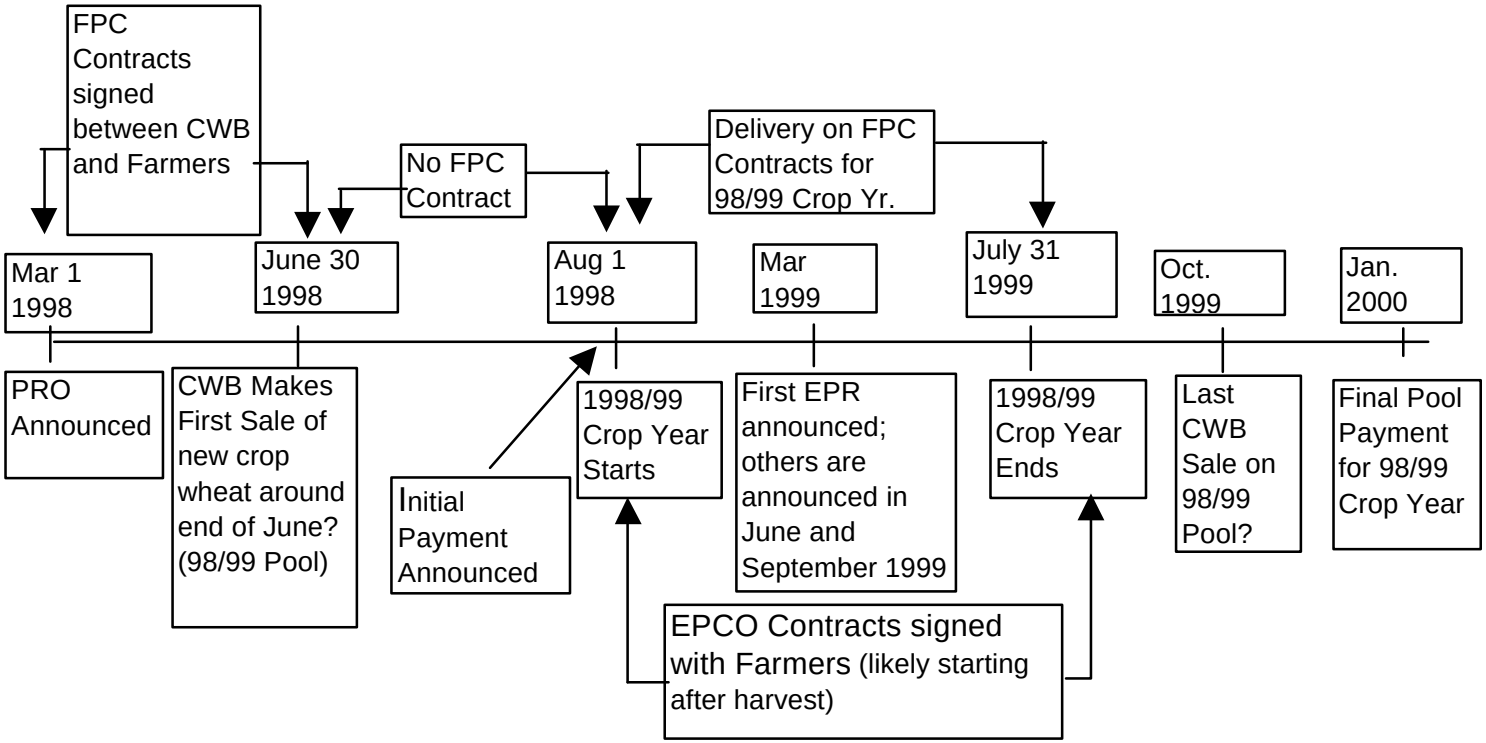


Figure 2. Nearby Wheat Futures Prices (1993/94 Crop Years)

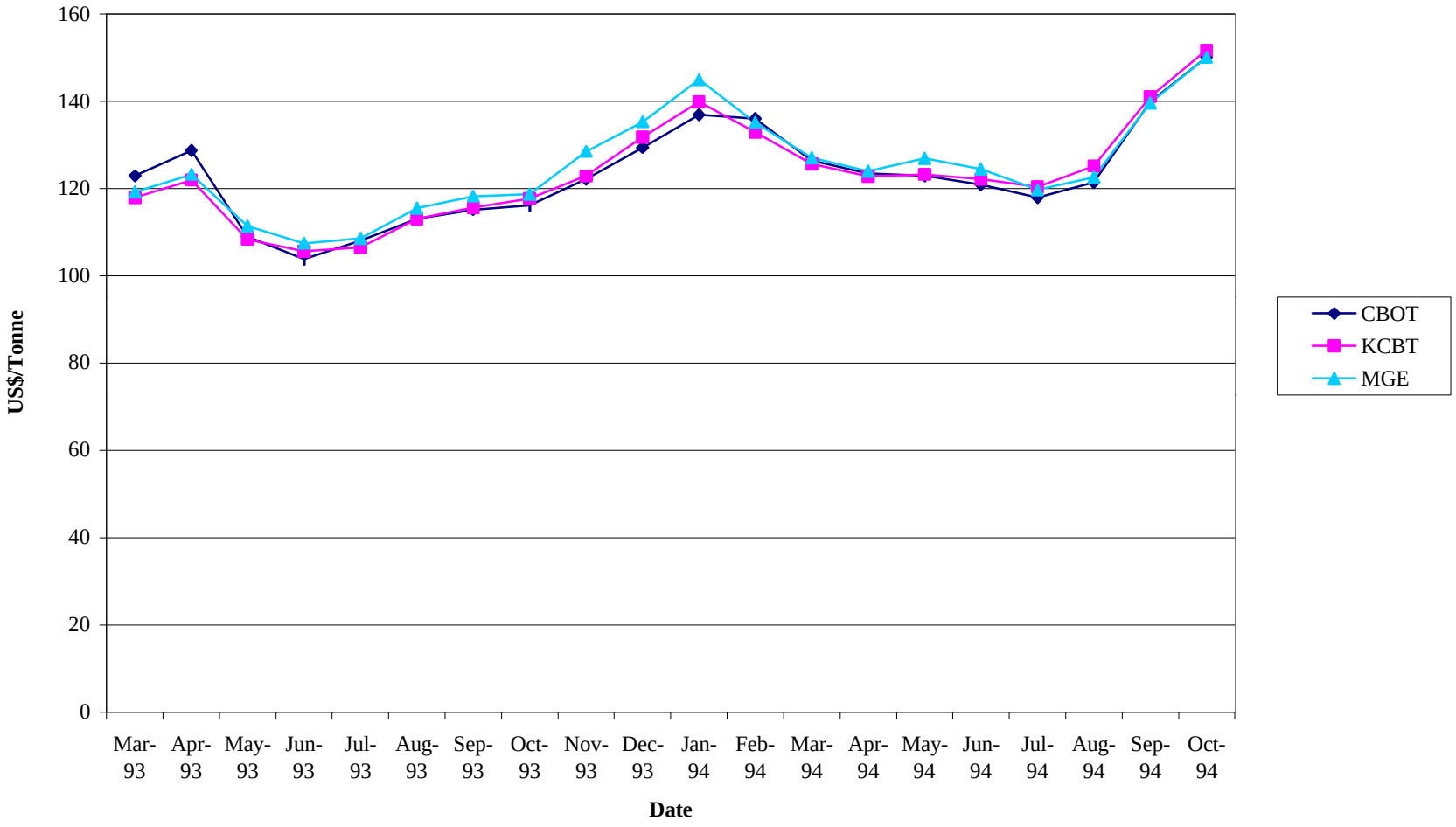


Figure 3: Nearby Wheat Futures Prices (1994/95 Crop Year)

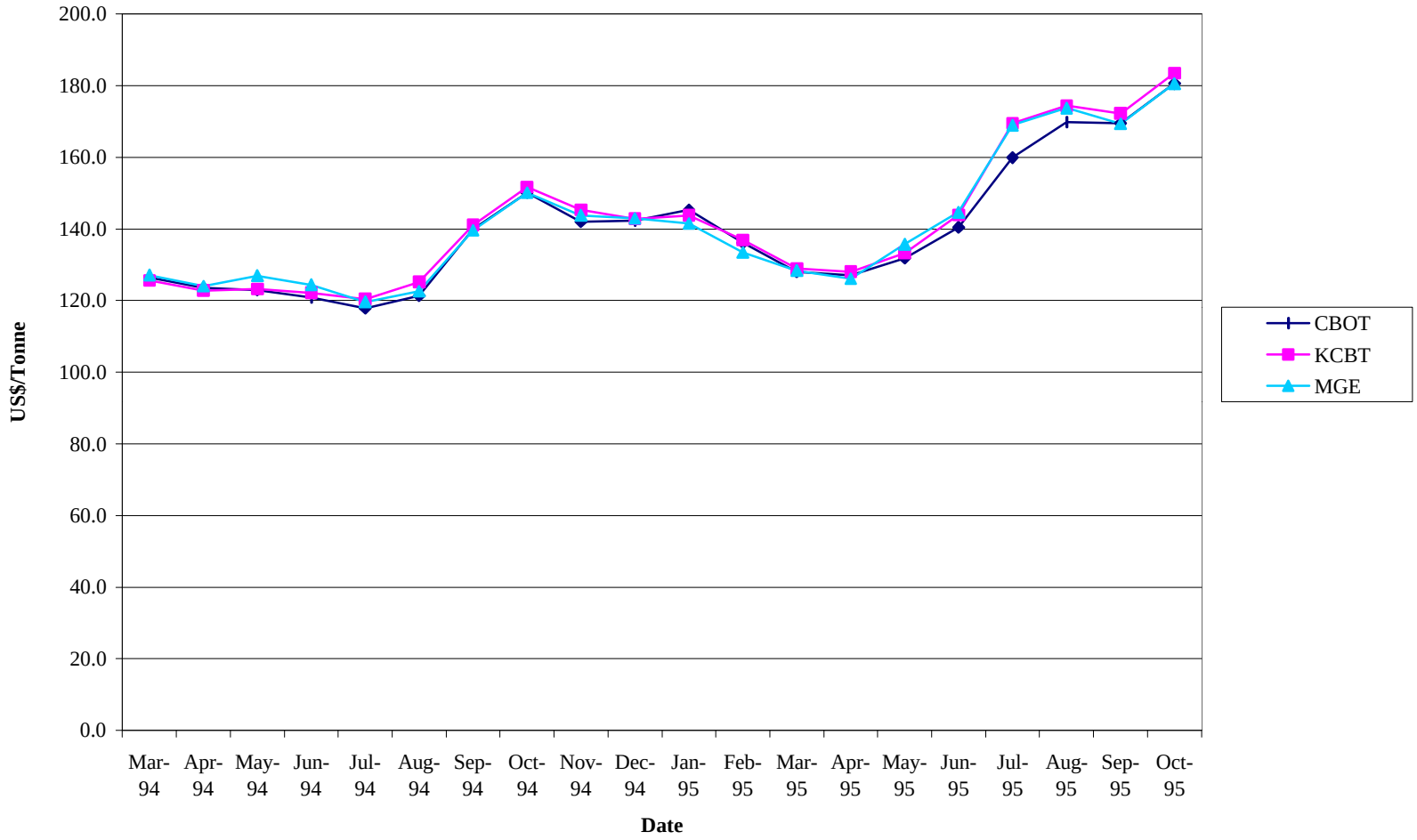


Figure 4 Nearby Wheat Futures Prices (1995/96 Crop Year)

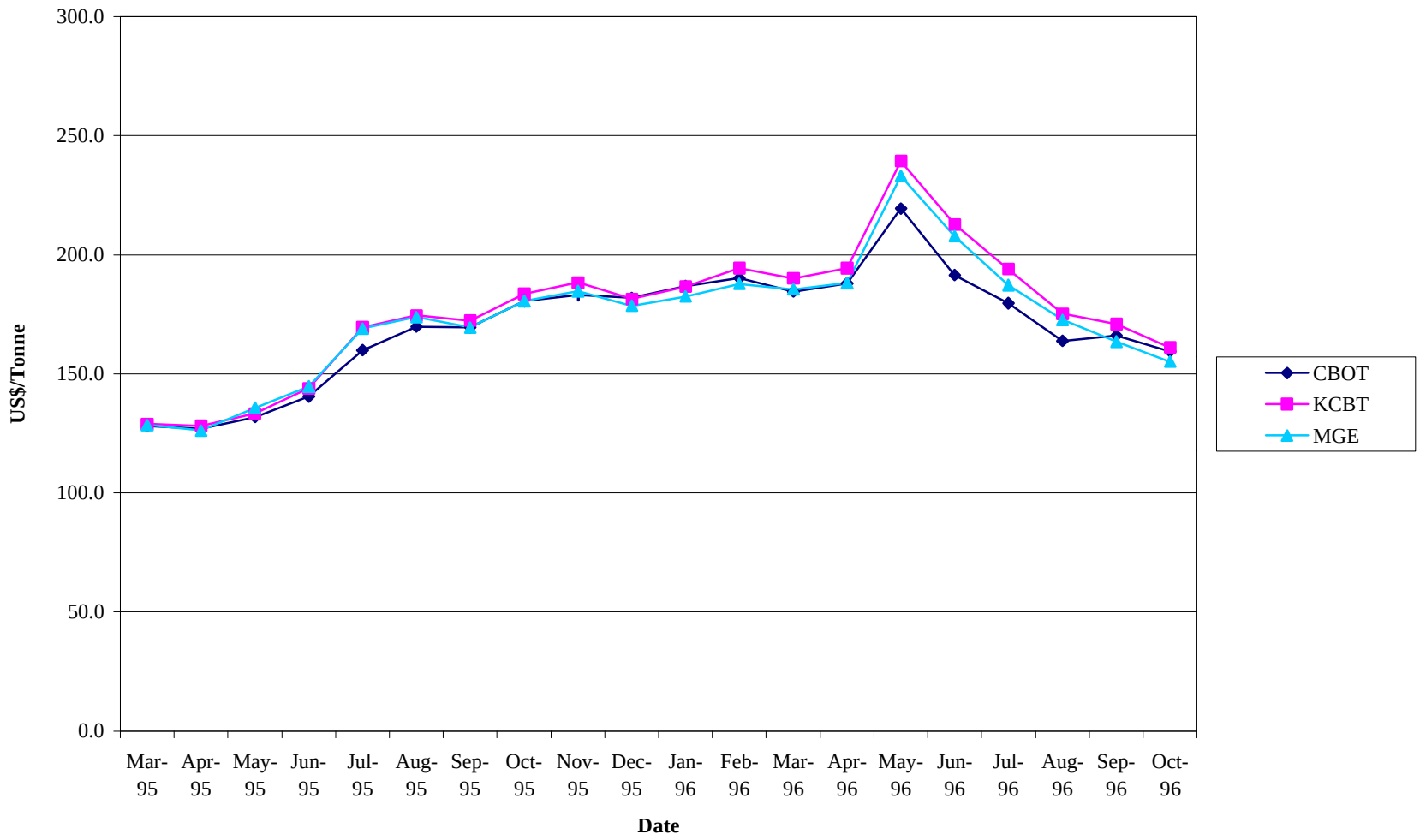


Figure 5. Nearby Wheat Futures Prices (1996/97 Crop Year)

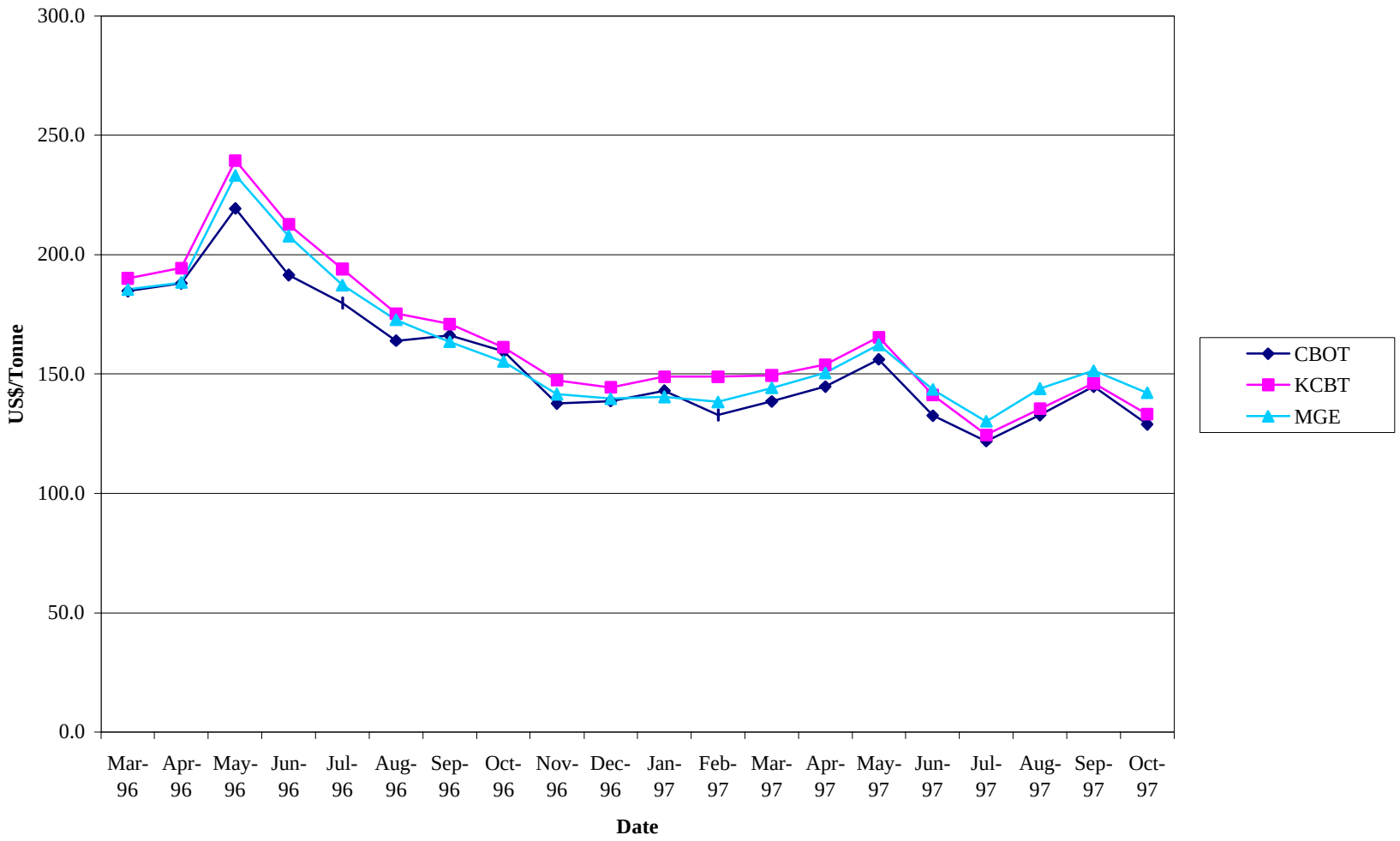


Figure 6. 1993/94 Nearby Currency Futures on Canadian dollars (US$/C$)

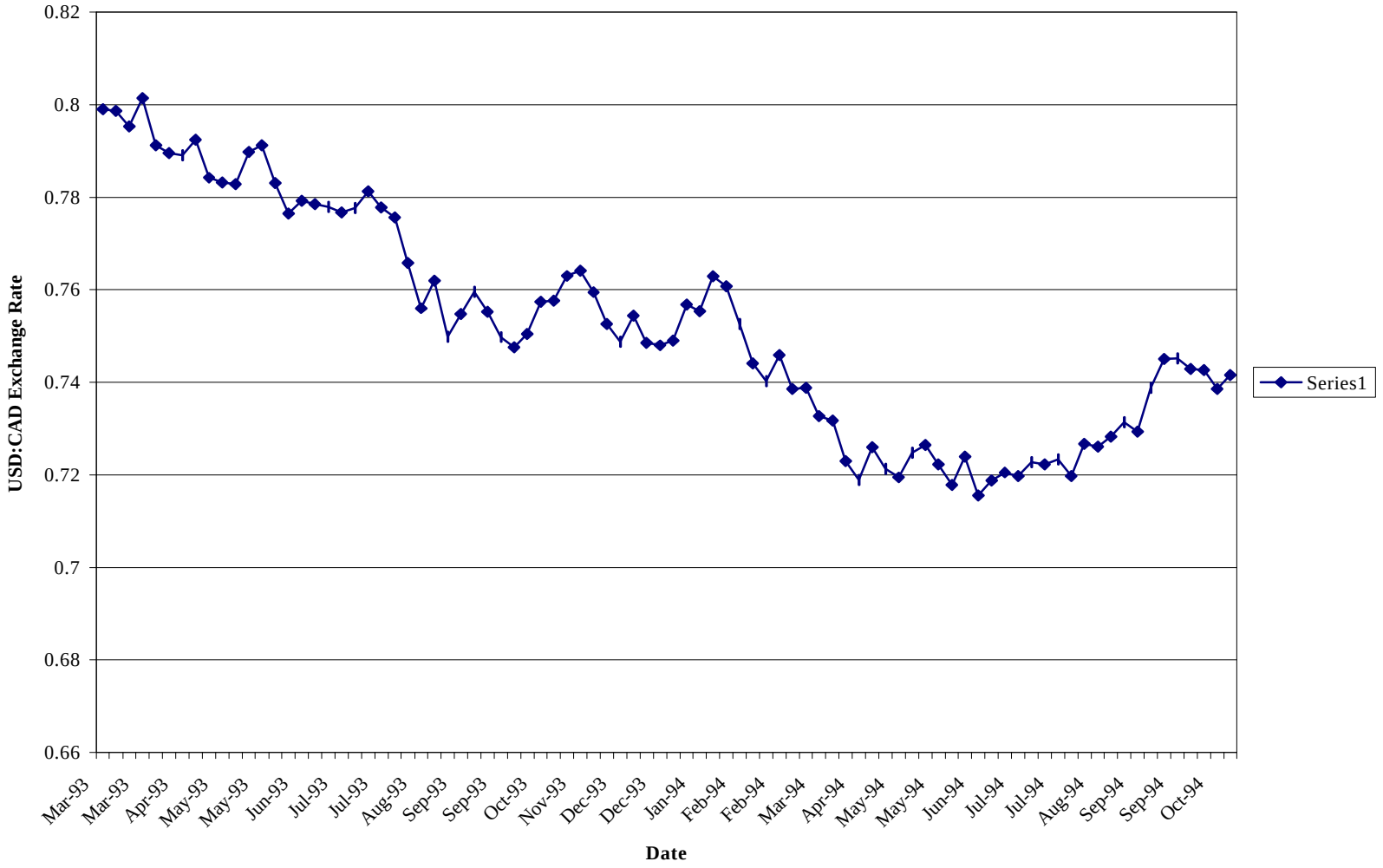


Figure 7. 1994/95 Nearby Currency Futures on Canadian dollars (US$/C$)

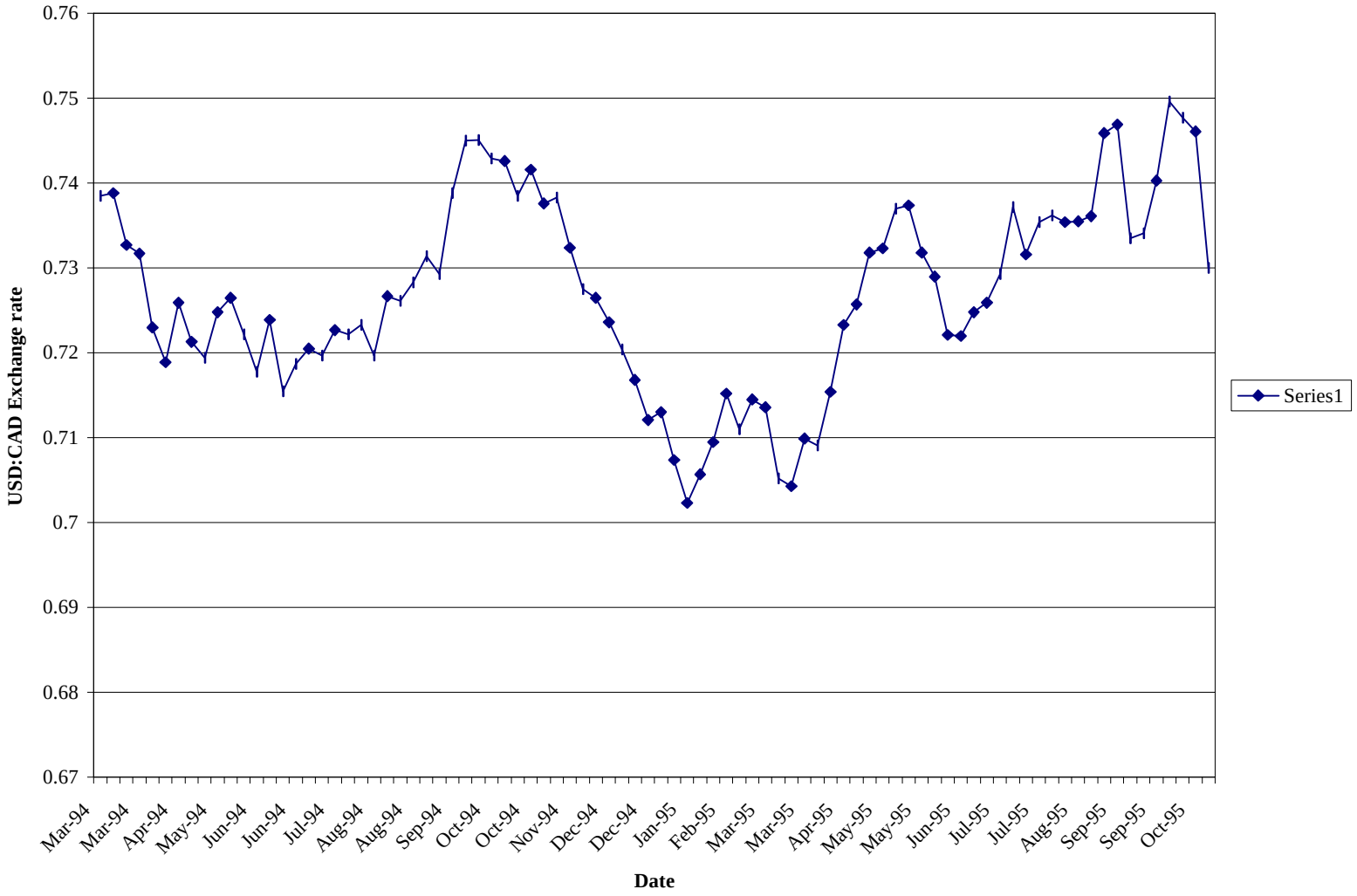


Figure 8. 1995/96 Nearby Currency Futures on Canadian dollars (US$/C$)

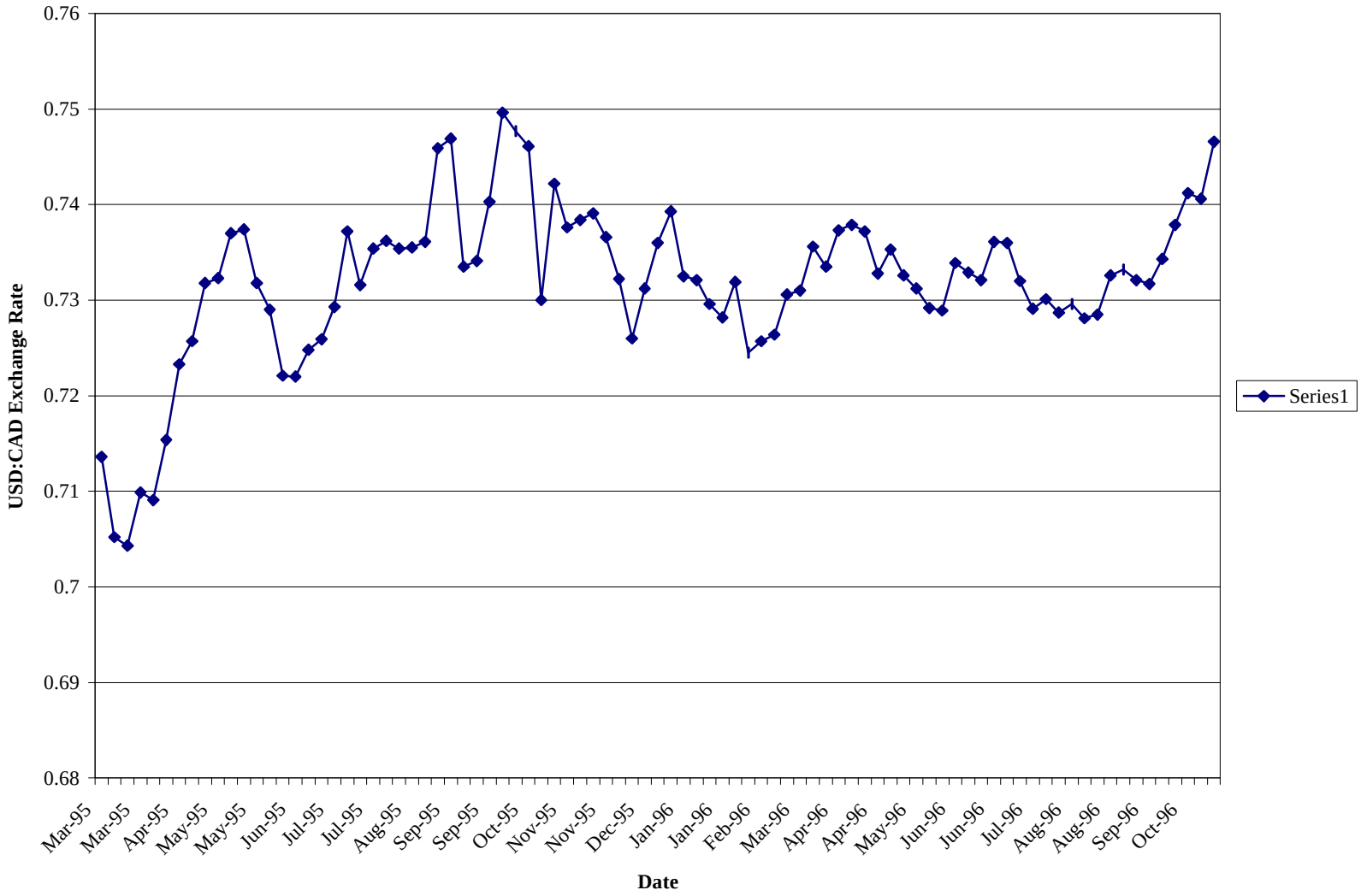
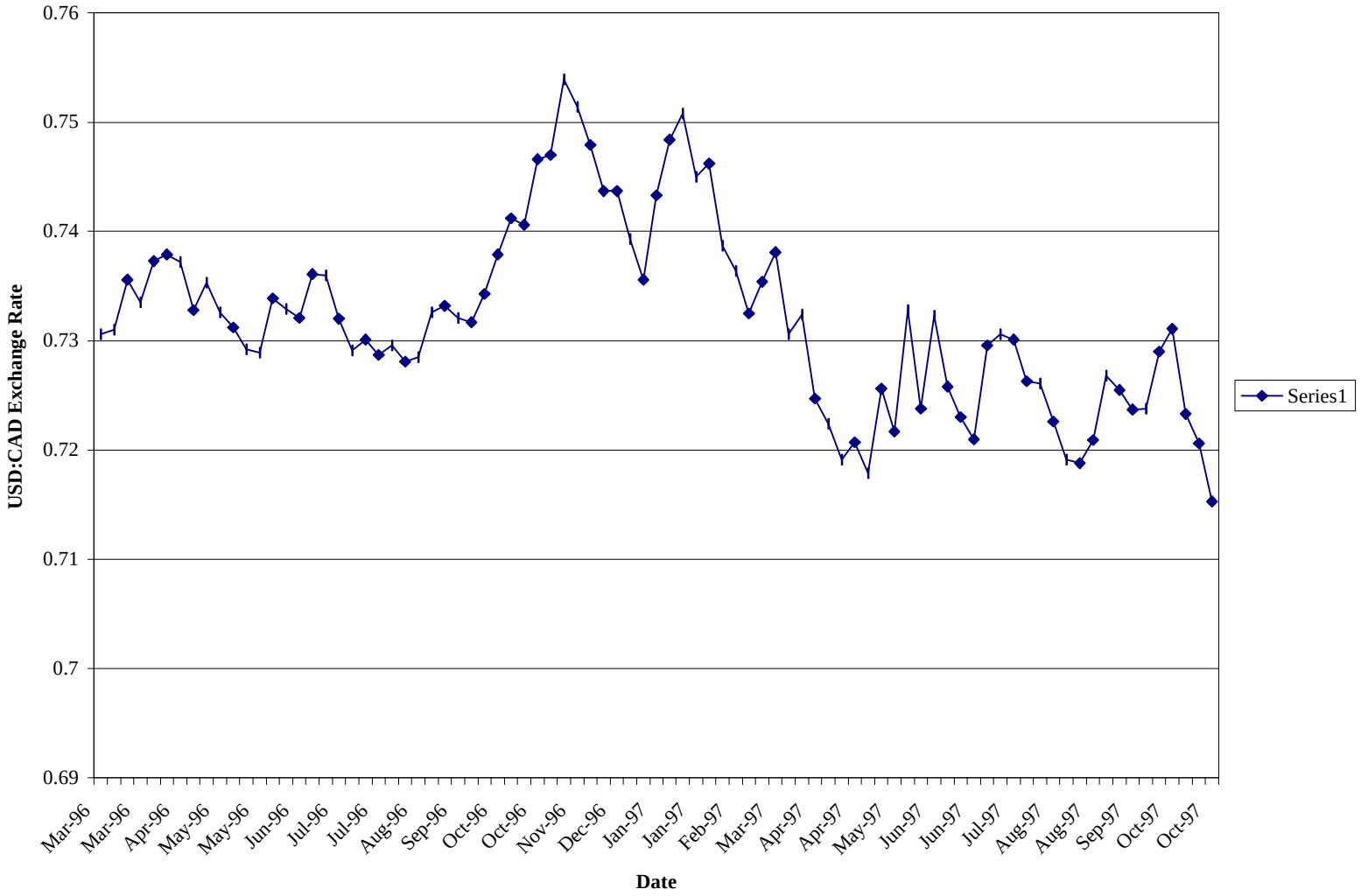


Figure 9. 1996/97 Nearby Currency Futures on Canadian dollars (US$/C$)



11 APPENDIX 3. Equations

11.1 Wheat Hedge Values Equation

Below is the formula for calculating wheat hedge position in the simulation:

$$HP_{t+j} = \sum_{m=1}^{4} \left\{ \left\{ \sum_{t=1}^{T} \sum_{x=1}^{3} \sum_{k=1}^{K} \left[\left(F_{t,t+j,k,x} - F_{t+j,k+j,x} \right) * \left(\left(PT_x * PS_t \right) / K \right) \right] \right\} / S_{t+j} \right\} / 4 \quad (1)$$

where

HP_{t+j} = Average hedge profit/loss from 3 Exchanges for the year

m = Months in which FPCs and EPCOs contracts are signed (March, April, May and June & September, December, March and June respectively);

t = Signing periods within the crop year

x = Exchanges, viz., CBOT, Kansas, and Minneapolis Exchanges;

k = Wednesdays in trading months (March, April, May, June & September, December, March and June);

K= Total number of Wednesdays in trading month

$F_{t,t+j,k,x}$ = Futures price trading at time t for delivery at time $t+j$ on Exchange x in USD.

$F_{t+j,k,x}$ = Futures buy back price of wheat at time $t+j$ on Exchange x on a Wednesday of month prior to contract expiration month in USD.

PT_x = Percentage of contract traded on Exchange x

PS = Projected sale of wheat made in contract month

S_{t+j} = Spot exchange rate of USD to CAD on buy back date to convert USD into CAD.

11.2 Exchange Rate Hedge Value Equation

The formula for calculating the exchange rate hedge position in the simulation is given by:

$$FXHP_{t+j} = \sum_{m=1}^{4} \left\{ \left\{ \sum_{t=1}^{T} \sum_{x=1}^{3} \sum_{k=1}^{K} \left[\left(FXF_{t,t+j,k} - FXF_{t+j,k+j} \right) * \left(F_{t,t+j,k,x} * PT_x * PS_t \right) / K \right] \right\} / S_{t+j} \right\} / 4 \quad (2)$$

where

$FXHP_{t+j}$ = Average currency hedge profit/loss at time $t+j$ from trading for the year

$F_{t,t+j,k,x}$ = Futures price trading at time t for delivery at time $t+j$ on Exchange x in USD.

m = Months in which FPCs and EPCOs are signed (March, April, May, June & September, December, March and June);

t = Signing periods within the crop year

k = Wednesdays in trading month (March, April, May, June & September, December, March and June);

K= Total number of Wednesdays in trading month

$FXF_{t,t+j,k}$ = Price of buying exchange rate futures at time $t+j$ trading on a Wednesday (k) at time t.

$FXF_{t+j,k}$ = Price of selling exchange rate futures at time $t+j$.

PT_x = Percentage of contract traded on Exchange x

PS = Projected sale of wheat made in contract month

S_{t+j} = Spot exchange rate of USD to CAD on buy back date to convert USD into CAD.

11.3 Fixed Price Contract Value Equation

The value for the Fixed Price contract is given by the formula

$$FPC1 \quad value_i = \left\{ \left(0.25 * PRO_i\right) \Big/ \left(1+r\right)^{T-t} \right\} + \left(0.75 * PRO_i\right) \qquad (3)$$

where

FPC value$_i$ = the value of a FPC in month i.

PRO$_i$ = the Pool Return Outlook for the month,

r = the 2 year Government of Canada bond yield for the month in which the contract was signed,

T-t = the period between the signing of the contract and the time final payments are made (i.e., from March 98 to January 2000).

The value of FPC2 is

$$FPC2 \quad value_i = \left\{ \left(0.15 * PRO_i\right) \Big/ \left(1+r\right)^{T-t} \right\} + \left(0.85 * PRO_i\right) \qquad (4)$$

where the variables are as defined in Equation 3.

11.4 EPCO Value Equation

The formula used in calculating the EPCO is

$$EPCO \quad value_i = \left[\left(PRO_i - Initial_i - Adjustment_{i+t} \right) / \left(1 + r \right)^{T-t} \right] \quad (5)$$

where

EPCO $value_i$ = Value of EPCO contract in month *i*

r = the 1-year Government of Canada bond yield for the month the contract was signed,

T-t = the period between the time the contract was signed and the time the final payments are made (e.g., between September 1993 and January 1995);

i, t = time periods.

11.5 Grade Spread Risk Formula

The formula used to calculate the grade spread risk is:

$$gsr = hq * (hps - ps) \quad (6)$$

where

gsr = grade spread risk

hq = ratio of historical quantity of grade delivered to the total historical mean of all grades delivered

hps = the historical mean price spread between grades (e.g. between #1 and #2)

ps = the final pool price spread of the grades for the historical years under study.