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Marketing Contracts, Overconfidence, and Timing in the Canadian Wheat Market

Fabio L. Mattos and Stefanie A. Fryza

This paper investigates factors that impact marketing performance in the Canadian wheat market. Using data provided by the Canadian Wheat Board (CWB) for six crop years, results indicate that producers were not able to profitably use all marketing contracts offered by the CWB, earlier pricing tended to generate better performance, there was a negative relationship between activeness and performance (suggesting overconfidence in marketing skills), and performance was generally worse in volatile crop years. Further analysis reveals some of these findings differ when outperforming and underperforming producers are investigated separately, particularly with respect to activeness and volatility.

Key words: Canadian Wheat Board, marketing contracts, overconfidence, performance, timing

Introduction

Marketing decisions are an important dimension of farm management. Dhuyvetter, Morris, and Kastens found evidence that “price has become increasingly significant in explaining profitability differences across producers” (2011, p.14), even though there are other farm management attributes (e.g., costs and yields) that are more significant when explaining differences in profits across producers. In addition, Zulauf et al. (2006) argued that even if price is typically found to have little impact in helping producers profitably distinguish themselves from other producers, it is still important to explain producers’ variation in management performance across time.

Previous studies investigated marketing performance using data on individual transactions or average prices received by a representative sample of producers (Anderson and Brorsen, 2005; Dietz et al., 2009; Hagedorn et al., 2005). These studies explored marketing performance by addressing the question of how producers tend to perform relative to a given benchmark. Their results showed evidence that marketing performance is equal to or above the market benchmark (Anderson and Brorsen, 2005) or generally lies within the middle third of the price range (Dietz et al., 2009; Hagedorn et al., 2005).

Another group of studies used data on marketing recommendations by advisory services or individual transactions by producers to explore the impact of marketing styles on performance (Cabrini, Irwin, and Good, 2007; Cunningham III, Brorsen, and Anderson, 2007). Both studies used marketing activeness (i.e., how often producers try to time the market to obtain higher prices) and time of the year when crop is sold as style characteristics, while Cabrini, Irwin, and Good (2007) also included intensity of futures and options use. Results are somewhat mixed. While it was generally found that selling later in the marketing window led to lower performance, there were contrasting outcomes with respect to activeness. Cabrini, Irwin, and Good (2007) found a positive

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relationship between marketing activeness and performance, while Cunningham III, Brorsen, and Anderson (2007) found the opposite.

In spite of the important findings and new insights about marketing style and performance provided by the studies above, it remains to be seen how their results compare to larger samples in a wider geographical area and across different ranges of marketing performance. The grain marketing system in Canada offers a unique opportunity to explore performance. All wheat produced in Western Canada and sold for human consumption or export must be marketed through the Canadian Wheat Board (CWB). The CWB is the largest grain-marketing agency in Canada and has been responsible for approximately 90% of all wheat produced in the country in the last ten years.¹ Since producers must execute all wheat sales through a single agency, the CWB has records showing exactly how all producers chose to market their wheat and the prices they received at the end of each crop year.

This paper investigates factors that impact marketing performance in the Canadian wheat market. The key questions addressed are whether producers can identify and take advantage of profit opportunities using different marketing contracts, whether time of the year when wheat is priced or price variability affect performance, and whether producers have better information or analytical ability to outperform the markets (or if they are overconfident in their ability to market their wheat). Data were provided by the CWB and are comprised of marketing instruments chosen by each producer and the respective prices received from 2003/04 to 2008/09. The sample of wheat producers is also divided into categories according to their marketing performance. Each subsample is investigated in order to explore how each category differs with respect to the impact of contract usage, timing, activeness, and price variability on marketing performance.

Despite its relevance in farm management, it is alarming to realize that prevailing ideas about marketing decisions and performance still do not rely on a large body of evidence (Hagedorn et al., 2005). This study can shed more light on the debate about marketing style and performance because it examines a larger sample of producers in a unique market structure. Producers and the CWB can use this research to improve the design and communication of marketing alternatives developed for producers. Results may also be relevant for government agencies, extension programs, and market advisory services, which might be able to gather more insight about producers' marketing behavior. Finally, findings from this research can be particularly relevant for all market participants as Canada moves towards the deregulation of its wheat market, which will allow producers to market their grain outside the CWB and directly with elevators, grain companies, and other buyers in an open market.

Background

The CWB is the largest grain-marketing agency in Canada and sole marketer for wheat produced in Western Canada, encompassing the provinces of Manitoba, Saskatchewan, Alberta, and the Peace River area of British Columbia. These regions produce approximately 90% of all wheat grown in Canada. The CWB will cease to be the sole marketer of wheat following the 2011/2012 crop year,² but during the time period encompassed by this study it still centralized all wheat sales in Western Canada. The CWB offered different marketing alternatives, allowing producers to choose a program that met their own needs and preferences regarding return, risk, and cash flow.

The oldest pricing alternative is pool pricing, which has been the main marketing program for Western Canada wheat since the 1930s. The pool worked by pooling all wheat from producers in Western Canada to be traded by the CWB, giving the organization more market power to obtain

¹ Recent changes in the Canadian marketing system will allow producers to sell their wheat without the CWB starting in the 2012/2013 crop year, but all wheat sales for export and human consumption had to go through the CWB during the time period considered in this study.

² On October 18, 2011, the Canadian government introduced Bill C-18 to remove the CWB as the sole seller of wheat produced in Western Canada. The Marketing Freedom for Grain Farmers Act passed on November 28, 2011, ratifying this change.

higher prices.³ Pool revenues were then distributed such that all producers received the same final price per unit regardless of when and to whom their grain was sold. With the pool, producers received an initial payment when deliveries were made to the grain handling facility and additional payments as sales were completed throughout the crop year. The final pool price was known only after the end of the crop year, which extends from August 1 to July 31.

The CWB developed marketing contracts collectively known as Producer Payment Options (PPO) to allow producers to price their own grain and provide flexibility to manage their cash flow (Canadian Wheat Board, 2012). These contracts were first offered in the 2000/2001 crop year and allowed producers to make their own marketing decisions. However, the CWB still had to execute these contracts. PPO contracts also differed from pool accounts in terms of payment schedule. Producers still received an initial payment when they delivered their wheat to the grain-handling facility, but their final payment would come within ten business days. Producers who used these marketing contracts could receive their full payment before the end of the crop year.

The CWB developed five types of PPO contracts: Early Payment Options (EPO), Fixed Price Contracts (FPC), Basis Price Contracts (BPC), Daily Price Contracts (DPC), and FlexPro. The EPO was mainly used for cash-flow management; its price was just a fixed proportion of the expected pool price. The FPC offered a daily fixed price derived from the wheat futures contract traded at the Minneapolis Grain Exchange (MGE). In principle, the FPC resembled a futures contract. The BPC was fundamentally a basis contract and allowed producers to lock in a futures price (based on the MGE) and basis at different times during the marketing window, so their final price was only known after both components were determined. The DPC and FlexPro offered producers a daily cash price based on wheat traded at the port of Vancouver; hence, it worked essentially as a forward contract. Note that the DPC was terminated after the 2007/08 crop year and FlexPro was created in the 2008/09 crop year. For the purpose of this paper, since the DPC and FlexPro were very similar in their functions and specifications, they are combined into one contract and generally referred to as "DPC."

Producers could sell their wheat using any combination of these marketing contracts and the pool. The marketing window during which producers could allocate their wheat to each marketing program varied across contracts. In most years the marketing window for the BPC and FPC started about five months before the beginning of the crop year and ended approximately three months into the crop year.⁴ As for the DPC and FlexPro, producers had the entire crop year to price their grain, but they needed to indicate the tonnage they wanted to price with these contracts prior to the beginning of the crop year.

Previous Studies

Few studies have empirically explored individual characteristics that impact marketing performance of agricultural producers. Cunningham III, Brorsen, and Anderson (2007) investigated wheat producers in Oklahoma from 1992 to 2001 and explored how marketing activeness and timing impacted performance. They found no statistically significant evidence that activeness in futures and options markets was related to pricing performance, indicating that producers who actively marketed their grain to obtain higher prices were not successful. Their results also showed that producers who sold their grain later in the marketing year tended to receive lower prices. Cabrini, Irwin, and Good (2007) investigated marketing recommendations from advisory programs in corn and soybean markets between 1995 and 2004. They focused on the impact of three style characteristics on marketing performance, including intensity of futures and options contracts use, marketing activeness, and seasonality of sales. Results revealed that more active programs exhibited higher prices, suggesting that services recommending active strategies exhibited superior information or

³ As a single agent selling Western Canadian wheat in the domestic and world markets, the CWB is able to consistently trade larger volumes than any individual producer in Canada.

⁴ The crop year runs from August 1 to July 31.

analytical skills. However, the authors indicated that results could have been driven by a single advisory service, so the model was estimated without the top-performing program. Results showed that the positive relationship between performance and activeness was significant only for soybeans. Cabrini, Irwin, and Good (2007) also found a negative relationship between performance and volume traded in futures and options markets, which they indicated was partially explained by brokerage fees. Finally, their findings showed that pricing later in the marketing window led to lower prices for corn, while the opposite results emerged for soybeans (note that statistical significance was weaker for soybeans).

The negative relationship between time of year and performance found for wheat and corn in those studies suggests that producers who stored longer tended to receive lower prices. Cunningham III, Brorsen, and Anderson (2007) explained this using ideas presented by Brorsen and Anderson (2001), who discussed implications of behavioral finance for agricultural marketing and explained psychological biases that can affect marketing decisions. They argued that producers might store longer than is optimal because they are overconfident in their abilities to identify the best time to price their grain or because producers exhibit myopic loss aversion (Cunningham III, Brorsen, and Anderson, 2007). Those ideas also apply to the discussion of marketing activeness and performance.

While Cunningham III, Brorsen, and Anderson (2007) found that producers using active strategies perform no better than those following passive strategies, Cabrini, Irwin, and Good (2007) indicated that producers may be able to profit by adopting active strategies suggested by advisory services. Still, none of them found a significant negative relationship between marketing activeness and performance, which would suggest that producers were overconfident in their abilities to time the market. In a survey of producers and extension marketing economists, Schroeder et al. (1998) found that both groups believed in the existence of marketing strategies that allows producers to time the market and obtain higher prices. In that survey, approximately 80% of subjects said they agreed or strongly agreed that “preharvest hedging strategies are available which allow producers, on average, to receive a higher price than always selling at harvest” or “there are market timing strategies available to producers which allow them to increase price received.” In this context, overconfidence occurs when individuals believe they have superior skills to outperform their peers, even though their performance shows otherwise.

Research Method

A regression model similar to Cabrini, Irwin, and Good (2007) and Cunningham III, Brorsen, and Anderson (2007) is used to investigate factors that impact marketing performance for wheat producers in Western Canada:

$$(1) \quad Performance_{i,t} = \alpha + \beta_F \%FPC_{i,t} + \beta_B \%BPC_{i,t} + \beta_D \%DPC_{i,t} + \delta Timing_{i,t} + \gamma Activeness_i + \theta Var_t + \lambda_A D_{Alberta,i} + \lambda_S D_{Saskatchewan,i} + \varepsilon_{i,t},$$

where $Performance_{i,t}$ is the marketing performance of producer i in year t ; $\%FPC_{i,t}$, $\%BPC_{i,t}$, and $\%DPC_{i,t}$ are the percentages of producer i 's total crop priced with each marketing contract (FPC, BPC, and DPC) in year t ; $Timing_{i,t}$ indicates the time during the marketing window in which producer i priced his grain with one of the marketing contracts in year t ; $Activeness_i$ is a measure of marketing activeness for producer i ; Var_t is a measure of price variability in the wheat market for crop year t ; and $D_{Alberta,i}$ and $D_{Saskatchewan,i}$ are dummy variables for the provinces of Alberta and Saskatchewan.

$Performance_{i,t}$ is calculated as the difference between the price producers received and a benchmark ($price\ received_{i,t} - benchmark_t$). Price received is the final price received by each producer for their wheat using a FPC, BPC, DPC, or any combination of these three contracts. Even if a producer also delivered part of his crop to the pool, only prices received from the marketing

contracts are considered when calculating price received. The benchmark adopted in this study is the CWB pool price. The model explores producers' marketing performance using contracts compared to what they could have received if they had chosen to let the CWB market their grain in the pool. Therefore, if the final price received by producer i in year t is above (below) the pool price, $Performance_{i,t}$ is positive (negative).

The percentage of grain priced with each marketing contract ($\%FPC$, $\%BPC$, $\%DPC$) indicates how much wheat producers try to market by themselves outside the pool. One contract available to wheat producers—the EPO—is not considered here because its price is simply a fixed proportion of the expected pool price; it essentially keeps producers in the pool. These three variables are calculated as tonnes priced with each contract divided by total tonnes marketed by producer i in year t . Total tonnes marketed in year t includes the whole amount that a producer priced with marketing contracts and the pool. Since wheat producers could have also delivered their wheat against the pool or the EPO, the sum of $\%FPC$, $\%BPC$, and $\%DPC$ is typically less than one. High (low) values for these variables— $\%FPC$, $\%BPC$, and $\%DPC$ —indicate more (fewer) tonnes priced with contracts and fewer (more) in the pool, suggesting producers might (not) perceive opportunities to profit from pricing their wheat outside the pool. A positive (negative) relationship between these variables and performance indicates that producers who price larger portions of their crop with contracts can achieve better (worse) performance compared to the pool.

The variable $Timing_{i,t}$ is used to indicate the time within the marketing window when producer i priced a marketing contract in year t . A single marketing window is adopted for all contracts during each crop year. The marketing window is assumed to start when the first contract is available and go until the deadline of the last contract. For example, in 2006/07 the BPC and FPC were first available in February 2006 and the DPC was last available in July 2007. Therefore, producers had a seventeen-month window to make their marketing decision. $Timing_{i,t}$ is indicated in relative terms, starting at zero for the first month and ending at one for the last month producer i can price wheat. Therefore $Timing_{i,t}$ is calculated by dividing the number of months from the beginning of the marketing window (starting at zero) to the moment the grain is priced by total number of months of the marketing period. This procedure is adopted because marketing windows have different lengths across crop years. If a producer prices his wheat with more than one contract (or uses the same contract more than once during the year), weighted averages are used to determine a $Timing_{i,t}$ value, and the weights are given by the quantity of tonnes priced on each date. A positive relationship between performance and $Timing_{i,t}$ suggests that pricing later (earlier) leads to better (worse) performance. On the other hand, a negative relationship suggests pricing earlier (later) leads to better (worse) performance.

The concept of marketing activeness adopted in this research follows Cunningham III, Brorsen, and Anderson (2007) and Cabrini, Irwin, and Good (2007) to assess whether producers follow a passive marketing strategy (e.g., price their wheat at the same time of the marketing window every year) or try to time the market by adopting more active strategies.⁵ More specifically, the calculation of *Activeness* _{i} is based on Cunningham III, Brorsen, and Anderson (2007). First, a series with the proportion of wheat that a producer priced with contracts in each week of the marketing window relative to his total production is created. Then the tonne-weighted average week marketed ($awk_{i,t}$) is calculated for each producer i in year t as in equation (2), where $wk_{i,t,w}$ is the week grain is marketed, $wvol_{i,t,w}$ is tonnes marketed in week w , and $tvol_{i,t}$ is total tonnes marketed in the crop year. For example, if a producer used marketing contracts to price 50% of his wheat, 25% during the seventh week and another 25% during the ninth week of the marketing window, his tonne-weighted average week marketed would be equal to 8. The measure of marketing activeness for each producer is given by the standard deviation of $awk_{i,t}$ series calculated as in equation (3), where n is the number

⁵ Cabrini, Irwin, and Good (2007) identified four measures of activeness in their research because they suggest there is no one measure that can be used to describe the differences in degrees of activeness. Some of these measures were based on marketing strategies dealing with futures and options contracts. In the current research, data on futures and options usage by individual producers are not available.

of years in which producer i marketed wheat, and \overline{awk}_i is the mean of $awk_{i,t}$ for each producer across crop years. Note that producers had to use marketing contracts (FPC, BPC, or DPC) in at least two crop years in order to be considered in the calculation of activeness for this model.

$$(2) \quad awk_{i,t} = \sum_{w=1} \frac{wvol_{i,t,w} \times wk_{i,t,w}}{tvol_{i,t}}$$

$$(3) \quad Activeness_i = \sqrt{\sum_{t=1} (awk_{i,t} - \overline{awk}_i)^2 / n - 1}$$

The activeness measure is then standardized so it can be expressed in terms of standard deviation relative to the marketing activeness of the average sampled producer.⁶ A higher activeness index suggests the producer is more active compared to the average producer's strategy, meaning each year the producer prices his wheat in different weeks. Therefore, a positive (negative) relationship between marketing activeness and performance indicates that greater activeness leads to better (worse) performance. These relationships can be used to explore overconfidence. Producers who believe they have better information or analytical skills to outperform the benchmark tend to be more active in their marketing strategies. If greater activeness leads to poor performance it suggests producers are actually overconfident in their abilities to outperform the benchmark.

A positive relationship between marketing activeness and performance does not necessarily follow a positive relationship between contracts usage (%FPC, %BPC, %DPC) and performance. The fact that producers price larger portions of their crop with marketing contracts does not automatically indicate that they have a more active marketing strategy. For example, a producer can market all his grain using contracts and do so during the same week every year, indicating activeness equal to zero. A producer could also try to actively use contracts to time the market every year, but commit only a small fraction of his crop to these contracts while leaving most of the crop in the CWB pool. In this case, it is possible that the producer shows a positive relationship between activeness and performance but not necessarily a positive relationship between contract usage and performance.

The variable Var_t measures price variability in the wheat market in each crop year. It is given by the coefficient of variation of the nearby price of the wheat futures contract traded at the MGE. The mean and standard deviation of the daily nearby futures price is calculated and one value for Var_t (coefficient of variation) is obtained for each crop year. The MGE futures price was chosen as a reference for the wheat market, since Var_t is supposed to serve as a general measure of price variability.⁷

Finally, three provinces are encompassed by the CWB marketing system: Alberta, Saskatchewan and Manitoba.⁸ The dummy variables take a value of one if producer i is located in Alberta ($D_{Alberta,i}$) or Saskatchewan ($D_{Saskatchewan,i}$) and zero otherwise, thus indicating marketing performance relative to Manitoba.

Data

Data for this research were provided by the CWB and include all producers who grew Canada Western Red Spring (CWRS) wheat from 2003/04 through 2008/09. The sample used in the regression model only includes producers who grew CWRS wheat in at least two of the six crop years and marketed their wheat using at least one of three marketing contracts (FPC, BPC, DPC)

⁶ A standardized activeness index for producer i is calculated by subtracting the average activeness across all producers from producer i 's activeness measure and then dividing by the standard deviation of activeness across all producers.

⁷ The coefficient of variation for actual daily prices offered by FPC and DPC was also calculated for each crop year and the results were similar to the coefficient of variation for the MGE futures price.

⁸ A small area in the province of British Columbia is also part of the CWB system, but it was not considered in this study given the very limited number of producers from that area that used marketing contracts.

in Manitoba, Saskatchewan, and Alberta. There are 7,400 producers in the data set that meet these criteria.⁹ Not all producers used contracts in all six crop years: 4,088 producers used contracts in two years, 2,041 in three years, 908 in four years, 311 in five years and 52 in six years.¹⁰ The dataset contains transactions made by each producer that indicate (i) what contracts they used to market their wheat, (ii) how many tonnes of wheat were allocated to each contract, (iii) dates when producers priced their wheat with contracts, (iv) final price received by each producer for each marketing contract, and (v) province. The final price received by each producer is calculated as a weighted average of all prices received with each contract. The weights are the number of tonnes allocated to each contract.

Marketing performance is investigated for the entire sample of producers and also for subgroups of outperforming and underperforming producers, such that different characteristics among producers who perform better and worse than the CWB pool can be explored. Three criteria are adopted to categorize producers. First, weighted average performances are calculated for each producer across the six crop years (tonnes priced with contracts in each year are the weights), and then the sample is divided into two groups with producers whose average performance is positive and negative. This is a simple criterion and may be misleading if there is little difference between positive and negative average performance around zero or high variability in individual performance across crop years. In the first case it may not be possible to statistically distinguish between outperforming and underperforming producers across years. In the second case a producer could be in the group with positive (negative) average performance because he outperformed (underperformed) the pool by a large amount in one year but underperformed (outperformed) the pool by relatively smaller amounts in the other crop years. In this situation, the producer would be categorized in the outperforming (underperforming) group basically because of one good (bad) year.

Thus the discussion about performance extends to more refined sets of producers. A second criterion to categorize producers focuses on the upper and lower quartiles. Producers are ranked according to their weighted average performance across years, and two subsets are created based on the top and bottom 10%—the 740 producers (10% of the sample) with the highest average performance and the 740 producers with the lowest average performance. The third criterion categorizes producers according to their annual performance, with two subsets created: producers whose performance was positive or negative in all years in which they used marketing contracts.¹¹ There are 878 (645) producers whose performance was positive (negative) in all years they marketed wheat with contracts.¹²

Table 1 presents descriptive statistics on marketing performance and independent variables for the entire sample and all the subsets discussed above. Statistics for the entire sample—presented in the first column of table 1—are discussed first. Average performance for all producers was Cdn\$-16.1/tonne, indicating that the average price received by producers who used FPC, BPC, and DPC was Cdn\$16.1/tonne below the pool price between 2003/04 and 2008/09. This performance corresponds to 6.4% of the average pool price during those six crop years.¹³ The maximum performance obtained by a producer during those crop years was Cdn\$336/tonne above the pool, while the minimum was Cdn\$186.7/tonne below the pool. There is diversity in the amount of production priced with marketing contracts. FPC was used more often, followed by the BPC and DPC. On average, producers priced 33.8% of their crops with the FPC, 12.9% with the BPC,

⁹ The total number of producers who grew CWRS wheat between 2003/04 and 2008/09 was 67,798; thus the sample used in this study represents roughly 11% of all producers.

¹⁰ In all cases, producers could have used any combination of FPC, BPC, and DPC in each crop year.

¹¹ Note that producers must have used contracts in at least two crop years (following an initial criterion for this study) but not necessarily in all six crop years.

¹² Out of those, 725 (569) producers used contracts in two years, 133 (67) in three years, 19 (8) in four years, 1 (1) in five years and 0 (0) in all six years.

¹³ Pool prices were Cdn\$211.14/tonne in 2003/04, Cdn\$205.10/tonne in 2004/05, Cdn\$195.14/tonne in 2005/06, Cdn\$212.89/tonne in 2006/07, Cdn\$372.06/tonne in 2007/08, and Cdn\$311.06/tonne in 2008/09.

Table 1. Summary Statistics

Variable	All Producers (Pooled Years)	Producers Ranked by Average Performance Across Years		Producers Categorized by Annual Performance			
		Positive ^a	Negative ^a	Top 10% ^b	Bottom 10% ^b	All Positive ^c	All Negative ^c
Performance (Cdn\$/tonne) ^d							
mean	-16.1	14.3	-25.3	30.8	-49.8	27.6	-52.7
maximum	336.0	336.0	308.6	336.0	151.2	305.4	-0.0
3 rd quartile	22.7	30.3	17.0	49.6	9.1	30.7	-7.9
median	5.0	15.3	-0.5	25.5	-77.6	19.8	-45.4
1 st quartile	-77.6	2.3	-86.2	9.3	-107.6	7.8	-89.6
minimum	-186.7	-167.6	-186.7	-156.2	-180.4	0.0	-186.7
%FPC ^e							
mean	33.8	33.1	34.0	32.6	35.7	37.2	29.3
maximum	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3 rd quartile	54.9	52.5	54.4	51.4	59.6	63.6	49.8
median	25.6	22.8	26.5	21.3	27.1	26.2	19.7
1 st quartile	0.0	0.0	3.2	0.0	6.2	0.0	0.0
minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%BPC ^e							
mean	12.9	14.9	12.3	12.3	9.0	12.6	16.6
maximum	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3 rd quartile	16.1	18.9	15.3	11.6	5.1	11.6	25.6
median	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 st quartile	0.0	0.0	0.0	0.0	0.0	0.0	0.0
minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%DPC ^e							
mean	6.4	7.3	6.1	8.1	4.2	7.6	5.3
maximum	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3 rd quartile	0.0	0.0	0.0	0.0	0.0	0.0	0.0
median	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1 st quartile	0.0	0.0	0.0	0.0	0.0	0.0	0.0
minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Timing ^f							
mean	0.4	0.4	0.4	0.4	0.4	0.3	0.5
maximum	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3 rd quartile	0.5	0.5	0.5	0.5	0.5	0.5	0.6
median	0.4	0.4	0.4	0.3	0.5	0.3	0.5
1 st quartile	0.3	0.2	0.3	0.2	0.3	0.2	0.3
minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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Variable	All Producers (Pooled Years)	Producers Ranked by Average Performance Across Years		Producers Categorized by Annual Performance			
		Positive ^a	Negative ^a	Top 10% ^b	Bottom 10% ^b	All Positive ^c	All Negative ^c
Activeness ^g							
mean	0.0	-0.3	0.1	-0.3	0.1	-0.5	0.2
maximum	5.6	4.4	5.6	3.4	2.8	3.5	5.6
3 rd quartile	0.6	0.3	0.6	0.3	0.8	0.1	1.2
median	-0.1	-0.3	0.1	-0.4	0.1	-0.7	0.2
1 st quartile	-0.7	-1.0	-0.5	-1.1	-0.6	-1.3	-0.7
minimum	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Producers	7,400	1,805	5,595	740	740	878	645

Notes: ^aPositive (negative) refers to the subset of producers whose average performance across years was greater (less) than zero.

^b Top (bottom) 10% refers to the subset of producers encompassing 10% of the sample with the highest (lowest) average performance across years.

^cAll positive (negative) refers to producers who outperformed (underperformed) the pool in all years in which they used marketing contracts.

^dPerformance = price received minus pool price.

^ePercentage of crop priced with each marketing contract.

^fTiming is defined such that the first (last) month of the marketing window is equal to zero (one).

^gMarketing activeness is standardized; hence the average of the entire sample is zero.

and 6.4% with the DPC. There is also diversity within contracts. The interquartile ranges for the FPC, BPC, and DPC are 55, 16, and 0 percentage points, respectively. Even though maximum usage is often 100%, few producers used the BPC and DPC extensively compared to the FPC.

The average timing for wheat pricing is 0.4. This variable is expressed in relative terms, starting at zero for the first month of the marketing window and ending at one for the last month of the marketing window. Hence the average of 0.4 indicates a point just before the middle of the marketing window. Even though there were producers who priced their crop in the first and last months of the marketing window (minimum = 0 and maximum = 1), a larger portion of them seem to have priced their wheat either before or close to the middle of the marketing window (the 3rd quartile is 0.5 and the median is 0.4). The index of activeness presented in table 1 is measured in terms of standard deviations. Since the index is standardized, the mean of the entire sample is 0 and the maximum (minimum) value of 5.6 (-2.0) indicates a producer who was 5.6 (2.0) standard deviations more (less) active than the average producer.

For the sample partitions, mean performances are higher by definition for outperforming compared to underperforming producers, and interquartile ranges suggest that there is more dispersion in performance among underperforming producers. In terms of contract usage, there are no large differences in the descriptive statistics of percentage of crop priced with each contract across groups of producers. Differences across groups of producers seem to emerge with respect to timing and activeness regardless of the criteria adopted to partition the sample. Timing generally shows lower means, medians, and 1st quartiles for outperforming groups compared to underperforming groups, suggesting outperforming producers tend to price earlier than their underperforming peers. Similarly, activeness presents lower means, medians, and 3rd and 1st quartiles for outperforming producers, suggesting they adopt relatively less active strategies than underperforming producers.

The last independent variable is price variability, Var_t , which is measured by the coefficient of variation of MGE futures price and has one value for each crop year: 0.07 in 2003/04, 0.13 in 2004/05, 0.09 in both 2005/06 and 2006/07, 0.39 in 2007/08, and 0.27 in 2008/09. The crop year with the smallest (largest) price variability was 2003/04 (2007/08). The coefficients of variation also show that the last two years of the sample (2007/08 and 2008/09) exhibited more price variability than the first four years (this is further illustrated in figure 1). In addition to the price variability

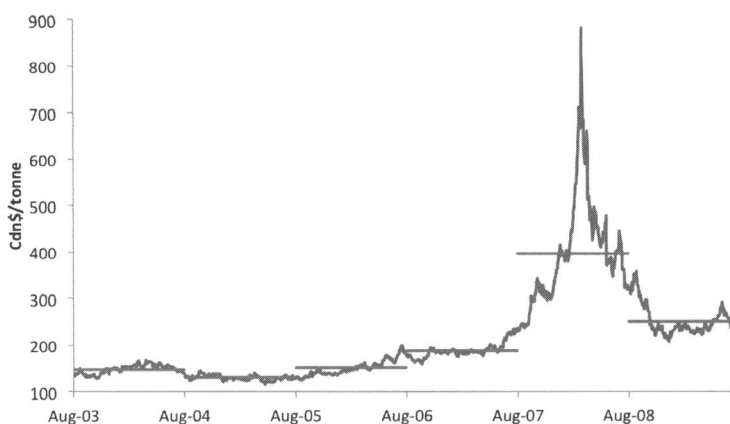


Figure 1. Nearby Futures Price Traded at the Minneapolis Grain Exchange (MGE), August 2003 to July 2009 (Cdn\$/tonne)

Notes: Horizontal lines indicate the average price for each crop year (August to July). Prices were converted from US\$/bu to Cdn\$/tonne using the daily exchange rate released by the Bank of Canada and adopting the conversion value of 36.744 bushel equivalents per tonne.

in the wheat market, it should be noted that wheat prices started an upward movement in 2005/06, which continued until 2007/08 and then reverted to a downward movement in 2008/09 (figure 1).

Results

The sample used in the estimation is specifically selected to include all producers who grew and priced CWRS wheat with a FPC, BPC, or DPC between 2003/04 and 2008/09. Considering how the measure of marketing activeness was calculated, an additional restriction is that producers need to have used marketing contracts in at least two crop years. Therefore it is not a random sample of wheat producers. Additionally, the regression contains unbalanced data since the number of producers varies across years.¹⁴

Equation (1) is estimated with panel regression procedures. The index of marketing activeness is one of the independent variables and represents an individual characteristic that varies across producers but not over time. The measure of price variability represents time-specific effects that vary over time but not across producers. The model is tested for the presence of heteroskedasticity and serial correlation in the residuals with a Breusch-Pagan test and the Breusch-Godfrey/Wooldridge test, respectively. Both null hypotheses that heteroskedasticity and serial correlation are not present can be rejected at 1%; thus, panel-corrected standard errors (PCSE) are adopted. The regression model is estimated for the entire sample (all producers) and also for subsets of producers divided according to performance. The division of the sample is performed in order to explore how the relationship between performance and the explanatory variables may change across distinct levels of performance.

Point estimates of equation (1) are presented in table 2. The first column shows estimation results for the entire sample (all producers), while the other columns contain estimates for groups of producers divided using average performance. The model with all producers is discussed first. Estimated coefficients for the percentage of crop priced with each of the marketing contracts are statistically significant for all contracts, being negative for the FPC and BPC and positive for the DPC. These results suggest that pricing larger portions of a producer's crop with FPC and BPC (DPC) tended to reduce (improve) performance. This could have a large impact on marketing performance. While some producers priced their whole crop (100%) with a FPC, the median

¹⁴ There are 264 producers sampled in 2003/04; 2,761 in 2004/05; 1,479 in 2005/06; 5,749 in 2006/07; 6,141 in 2007/08; and 3,404 in 2008/09.

Table 2. Panel Regression Models. Dependent Variable: Performance (2003/04–2008/09)

Variable	Producers Categorized by Average Performance across Years				
	All Producers	Positive ^a	Negative ^a	Top 10% ^b	Bottom 10% ^b
Constant	82.54*** (1.10)	63.89*** (2.71)	81.17*** (1.17)	56.91*** (5.10)	75.18*** (2.92)
%FPC _{i,t}	-0.43*** (0.01)	-0.33*** (0.03)	-0.41*** (0.01)	-0.36*** (0.04)	-0.29*** (0.04)
%BPC _{i,t}	-0.03** (0.02)	0.16*** (0.03)	-0.12*** (0.02)	0.28*** (0.06)	-0.29*** (0.05)
%DPC _{i,t}	0.08*** (0.02)	0.40*** (0.04)	-0.04** (0.02)	0.57*** (0.08)	-0.21*** (0.07)
Timing _{i,t}	-64.03*** (2.11)	-94.94*** (4.58)	-51.62*** (2.17)	-114.70*** (8.59)	-23.45*** (5.49)
Activeness _i	-2.84*** (0.35)	0.82 (0.79)	-3.18*** (0.34)	1.41 (1.41)	-5.55*** (0.98)
Var _i	-262.73*** (2.93)	-52.52*** (7.89)	-298.14*** (2.98)	92.08*** (14.39)	-371.70*** (8.85)
D _{Alberta}	1.49* (0.81)	4.31** (2.06)	-0.21 (0.82)	6.92** (3.12)	-7.56*** (2.05)
D _{Saskatchewan}	-2.32*** (0.78)	3.06* (1.80)	-6.17*** (0.80)	3.26 (3.53)	-2.15 (2.34)
Adjusted R ²	0.47	0.14	0.57	0.13	0.70
F-statistic	2,226.34	91.17	2,564.43	33.25	476.41
Observations	19,798	4,580	15,218	1,725	1,599
Producers	7,400	1,805	5,595	740	740

Notes: Standard errors are presented in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level.

^aProducers with positive (negative) performance are those whose weighted average performance across years is positive (negative); that is, those who outperformed (underperformed) the pool on average.

^bAll producers are ranked by average performance across years; the top (bottom) 10% refers to the subset encompassing 10% of the sample with the highest (lowest) average performance.

value for %FPC was 25.6%. Therefore, producers who priced their whole crop with a FPC would be expected to perform Cdn\$31.99/tonne worse than producers with the median amount priced. Findings suggest producers were not able to identify and take advantage of profit opportunities with the FPC and BPC. On the other hand, it appears they were able to use the DPC profitably. Note that the model adopted in this study evaluates (ex-ante) marketing strategies available during the crop year by considering (ex-post) marketing outcomes observed at the end of the crop year. The above results do not necessarily imply that producers failed to take profit opportunities offered by contracts, but rather that they were not able to anticipate market developments that occurred after their marketing decisions or some of their marketing choices turned out to be less profitable than the pool.

Timing has a negative and statistically significant coefficient, suggesting producers who priced their wheat earlier in the marketing window performed better compared to those who priced later. The practical implications of this estimate could be large. Recalling that the timing variable is defined such that the first month of the marketing window is equal to zero and the last month is equal to one, the median value of this variable was 0.4 while the maximum value was one. Thus producers who priced their wheat in the last month of the marketing window would have performed Cdn\$38.42/tonne worse compared to those at the median values and Cdn\$64.03/tonne worse compared to those who priced in the first month.

The estimated coefficient for the activeness index is also negative and statistically significant, suggesting that producers adopting more active marketing strategies tended to perform worse compared to those who were less active. The impact of marketing activeness on performance can be discussed by comparing the most and least active producers, along with those with median values for the activeness index. The expected marketing performance of the most active producer (5.6) was Cdn\$16.19/tonne lower than that of a producer with median activeness index (-0.1) and Cdn\$21.58/tonne lower than that of the least active producer (-2.0).

The measure of price variability showed a negative and statistically significant relationship with performance. The point estimate indicates that an increase of 0.01 points in the coefficient of variation would reduce performance by Cdn\$2.62/tonne. Results suggest that performance in 2007/08, the crop year with largest price variability (coefficient of variation=0.39), was Cdn\$84.07/tonne worse than in 2003/04, the crop year with the smallest price variability (coefficient of variation=0.07).

Finally, the binary variables for provinces are both statistically significant, being positive for Alberta and negative for Saskatchewan. The estimated coefficients suggest that average marketing performance of producers in Alberta and Saskatchewan was Cdn\$1.49/tonne higher and Cdn\$2.32/tonne lower than performance of producers in Manitoba.

Results for groups of producers categorized by average performance across years are presented in the other four columns of table 2. Findings with respect to contract usage indicate that the impact of FPC usage on performance is statistically significant and negative for both outperforming and underperforming producers. However, differences emerge with respect to the BPC and DPC. Estimated coefficients for both contracts are statistically significant but their signs differ across groups of producers, as BPC and DPC usage have a positive (negative) relationship with performance for the groups that outperform (underperform) the pool. In line with findings for the entire sample, results for timing show significant negative coefficients for all groups. However, magnitudes of estimated coefficients differ across groups, with outperforming producers exhibiting larger values than underperforming producers. This suggests that timing may be more relevant to explaining performance among outperforming than among underperforming producers.

Another characteristic that may differentiate producers is activeness. The estimated coefficient for outperforming producers is not statistically significant, suggesting activeness had no impact on their performance and thus they did not have better information or analytical skills to outperform the CWB pool. On the other hand, the coefficient is negative and statistically significant for underperforming producers, suggesting that producers with negative average performance drive the negative relationship between performance and activeness found for the entire sample. It appears that underperforming producers were overconfident in their marketing skills, and active strategies reduced their performance.

The impact of price variability on performance also differs across outperforming and underperforming producers. As can be seen in table 2, the estimated coefficient is negative and statistically significant for underperforming producers, but the signs are mixed for outperforming producers (negative for those with positive average performance but positive for the top 10%). In addition, the magnitude of the coefficients is larger for underperforming than for outperforming producers. The evidence suggests that underperforming producers were more affected by price variability in the wheat market. On average, performance for producers with negative (positive) average performance was Cdn\$95.40/tonne (Cdn\$16.81/tonne) lower in the most volatile crop year compared to the least volatile crop year, whereas performance for the bottom (top) 10% producers was Cdn\$118.94/tonne lower (Cdn\$29.47/tonne higher) in the most volatile crop year compared to the least volatile crop year.

The discussion about variables affecting producers who outperform and underperform the pool can be extended to more refined sets of producers. Table 3 presents results of the panel regression estimation for producers who outperformed or underperformed the CWB pool in all crop years they marketed wheat with contracts. This criterion is applied to the entire sample and also to the top and

Table 3. Panel Regression Models. Dependent Variable: Performance (2003/04–2008/09)

Variable	Producers Categorized by Annual Performance		Top 10% ^b with All Positive Annual Performance ^a	Bottom 10% ^b with All Negative Annual Performance ^a
	All Positive ^a	All Negative ^a		
Constant	-2.97 (2.62)	21.17*** (2.26)	-3.67 (3.84)	27.43*** (3.52)
%FPC _{<i>i,t</i>}	-0.09*** (0.02)	-0.04* (0.02)	-0.10*** (0.03)	0.02 (0.04)
%BPC _{<i>i,t</i>}	-0.13*** (0.03)	0.01 (0.03)	-0.18*** (0.04)	-0.02 (0.05)
%DPC _{<i>i,t</i>}	-0.08* (0.04)	0.18*** (0.05)	-0.10* (0.06)	-0.14* (0.08)
Timing _{<i>i,t</i>}	-10.55*** (3.84)	25.27*** (4.61)	-4.66 (6.31)	27.75*** (5.80)
Activeness _{<i>i</i>}	-1.21* (0.66)	-1.91*** (0.56)	-0.67 (0.87)	-4.01*** (1.08)
Var _{<i>t</i>}	255.65*** (10.37)	-318.43*** (7.29)	297.19*** (12.50)	-366.05*** (10.83)
D _{Alberta}	3.51** (1.54)	-3.34** (1.61)	3.19 (2.10)	-4.16* (2.46)
D _{Saskatchewan}	4.30** (1.71)	0.12 (1.64)	2.85 (2.29)	-3.81 (2.77)
Adjusted R ²	0.45	0.72	0.52	0.76
F-statistic	195.04	442.93	152.54	192.76
Observations	1,930	1,376	1,110	476
Producers	878	645	506	234

Notes: Standard errors are presented in parentheses. Single, double, and triple asterisks (*, **, ***) indicate statistical significance at the 10%, 5%, and 1% level.

^aAll positive (negative) refers to producers who outperformed (underperformed) the pool in all years in which they used marketing contracts. Note that producers in this sample must have used contracts in at least two years, but not necessarily in all six years.

^bAll producers are ranked by average performance across years; the top (bottom) 10% refers to the subset encompassing 10% of the sample with the highest (lowest) average performance.

bottom 10%. Findings show that all contracts have a negative and statistically significant impact on performance for outperforming producers. This contrasts with previous findings for producers with positive average performance, where only the FPC had a negative impact on performance. Estimated coefficients of contract usage for underperforming producers are either negative or not statistically significant, with the exception of the DPC for producers with negative performances in all years. This contrasts to some extent with previous results for producers with negative average performance, which exhibited significant negative coefficients for all contracts. Overall, considering all criteria to categorize producers, findings for contract usage suggest there is no strong evidence that producers might have been able to identify and take advantage of profit opportunities with the FPC, BPC, and DPC.

The estimated coefficient for timing is negative for the entire group of producers with positive performance in all crop years, but it is not statistically significant for those coming from the top 10%, which is somewhat consistent with results in table 2. On the other hand, coefficients are positive and statistically significant for underperforming producers, differing from previous results, which showed a negative relationship between timing and performance for producers with negative average performance. Although timing and performance generally exhibited a negative relationship among outperforming producers, results are mixed for underperforming producers according to the criterion adopted to categorize them.

The impact of marketing activeness on performance is negative and statistically significant for the entire group of producers with positive performance in all crop years, but it is not statistically significant for those coming from the top 10%. This contrasts slightly with results in table 2, which showed no significant relationship between activeness and performance among outperforming producers. Estimated coefficients for underperforming producers are negative and statistically significant, which is in line with results from table 2. Overall, findings suggest a negative relationship between activeness and performance for underperforming producers but offer no clear indication that activeness affects performance for outperforming producers.

The measure of price variability is statistically significant for all groups, being positive for outperforming and negative for underperforming producers. These results are similar in signs to previous findings in table 2 with respect to both sets of underperforming producers and the top 10% producers. This suggests that generally underperforming producers were negatively affected by price variability in the wheat market, while more refined sets of outperforming producers appear to benefit from larger price variability during the crop year. The practical implication of these findings can also be large. For example, in the year with the highest price variability producers with positive (negative) performance in all crop years would have performed, on average, Cdn\$81.81/tonne (Cdn\$101.90/tonne) better (worse) than in the year with the lowest price variability.

Conclusion

This research used data from the CWB to investigate marketing decisions and performance of Western Canadian producers who grew and priced CWRS wheat with marketing contracts. In particular, this research investigated the marketing strategies of 7,400 wheat producers who used CWB's marketing contracts in at least two years between 2003/04 and 2008/09. This study investigated producers' abilities to identify profitable opportunities with marketing contracts, their ability to outperform the CWB pool with marketing contracts, the degree of activeness in their marketing strategies, and how price variability in wheat markets affected their performance.

Regression results for performance relative to the CWB pool suggest that producers are generally not able to profitably anticipate market developments that occur after they make their marketing decisions with contracts. The relationship between performance and contract usage is usually negative or not statistically significant, indicating that marketing larger portions of their crop with contracts does not improve performance, which is generally the same results found under different criteria to investigate outperforming and underperforming producers. This finding could also be explained by other factors. Producers might use marketing contracts mainly for cash flow reasons, since they can receive their full payment earlier than if they stayed in the CWB pool. Another possibility is that the main marketing objective is to reduce risk rather than maximize price received. Schroeder et al. (1998) found that approximately 70% of producers in their survey agreed or strongly agreed with the statements "my primary marketing strategy is to reduce risk" and "the goal of a marketing strategy should be to decrease long-term risk over marketing years rather than to focus on an individual year." Finally, following the discussion by Brorsen and Anderson (2001), producers might choose marketing contracts based simply on what they used in the previous year or what their peers are doing, instead of considering carefully how each contract fits in their marketing plan.

Findings from the regression model also suggest that timing has a strong impact on performance, which is in line with previous studies by Cabrini, Irwin, and Good (2007) and Cunningham III, Brorsen, and Anderson (2007). There is evidence that early (late) pricing leads to better (worse) performance, both for the entire sample and for groups of outperforming and underperforming producers. On the other hand, findings about marketing activeness differ from Cabrini, Irwin, and Good (2007) and Cunningham III, Brorsen, and Anderson (2007). This study finds a negative relationship between activeness and performance, suggesting that producers who try to time the market perform worse than those who adopt less active strategies. This implies that producers may be overconfident in their ability to outperform the pool, since more active strategies tend to

generate poorer performances. Evidence of this negative relationship was particularly strong among underperforming producers, while there was little evidence of any association between activeness and performance among outperforming producers.

Price variability in the wheat market had a negative impact on performance, indicating that producers tend to perform worse in years with higher volatility in the market. However, this negative effect appears to be concentrated among underperforming producers, while outperforming producers seem to be able to improve marketing performance during years with higher volatility. This finding suggests that the competence to market wheat in more volatile environments—due to marketing skills or new opportunities emerging from market developments—may be one of the most important factors to determine whether producers will have positive or negative performance.

In summary, there appear to be two variables that can consistently distinguish producers by marketing performance. Underperforming producers appear to be overconfident in their ability to time the market and unable to price profitably in volatile markets. On the other hand, outperforming producers show no evidence of overconfidence and seem to be able to perform better than the CWB pool when the wheat market is more volatile.

Results from this study should take into account the limitations of the data. The CWB had records of 67,798 producers who grew and marketed CWRS wheat between 2003/04 and 2008/09, with the majority of them choosing to market their crop using the pool. Given the procedure adopted to calculate marketing activeness in this research, the actual sample of wheat producers who used marketing contracts during those six crop years included 7,400 producers. Although the sample encompasses all producers who used marketing contracts in at least two crop years between 2003/04 and 2008/09, it is still a relatively small portion (about 11%) of Canadian wheat producers. Furthermore, some producers in the sample did not use contracts in all crop years. Therefore, results obtained in this study do not necessarily reflect the decisions and performance of a representative Canadian wheat producer in an open market environment.

This paper contributes to the ongoing research regarding marketing performance and its determinants. Results provide new insights on producers' ability to use different marketing contracts profitably and how their active marketing strategies impact performance. Findings from this research should be helpful for the design and communication of strategies for producers. They should also be useful as more discussions emerge regarding the deregulation of the Canadian wheat market and the coming open market environment expected for the 2012/13 crop year.

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