Implications of a North American Grain Marketing System for Prairie Transportation & Elevators

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INTRODUCTION

The United States-Canada Free Trade Agreement, the North American Free Trade Agreement, the General Agreement on Tariffs and Trade, Canadian ownership of United States rail infrastructure, United States investment in Canadian and Mexican rail, all are evidence of the move toward a synthesized North American system for marketing grain in the world market. As this region's agriculture industry seeks further efficiencies, the migration toward a borderless North American grain marketing system may be encouraged or discouraged by regulatory and economic forces. If the impetus to gain efficiencies in the system continues to support greater coordination within the North American marketing system, there are implications for the infrastructure and market structure for both U.S. and Canadian producers.

For agriculture in the upper plains region of the United States, it seems deregulation of the rail industry initiated the compendium of change, including a move toward unit-train rail shipments, rationalization of the elevator and rail systems, and the emergence of the short-line rail industry. Procurement efficiencies have allowed producers the opportunity to deliver competitively priced products.

Canadian agriculture has begun to position itself to recognize some of these same efficiencies. The re-positioning is the focus of this project. To allow United States agricultural producers to be pro-active in their market, it is important to understand how changes in Canadian infrastructure and marketing may impact the grain marketing system and how these countries compete or interact in the market.

Background

In marketing grain, the initial process is procurement. This segment encompasses the farm to the local market segment of the grain supply chain. The procurement process for the Prairie Province's grain industry is similar to that of the north central United States, in that both regions utilize a country elevator system, branch-line rail network, and local road system to draw grain from a vast number of producers to local elevators for shipment to terminal markets. The Canadian system distinguishes itself, though, in the role that its provincial and federal governments play. This role is especially prevalent in wheat procurement because the government sanctioned Canadian Wheat Board is the sole marketer of wheat produced in the Prairie Provinces.

As illustrated in Table 1, the United States and Canada have vast resources invested in their grain procurement infrastructure. The rationalization of these resources is a dynamic process, allowing these countries to adapt their gathering and marketing processes to best serve their customers in both domestic and international markets.

Table 1. Profile of Canadian and United States Grain Procurement Resources

	United States	North Dakota	Canada*	Prairie Provinces*	Saskatchewan*
# of Elevators	10,717 [a.]	482 [b.]	1,199 [c.]	1,193 [c.]	656 [c.]
Total Capacity	8,085 b bu. [a.] rated off-farm storage	250 m bu. [b.]	6,500,610 tonnes [c.]	6,455,320 tonnes [c.]	3,545,040 tonnes [c.]
Turnover		2.41 [d.]		5.0 [c.]	
Total Class I Track Miles	125,072 [e.]	3,263 [e.] 1,563 [g.] (mainline) 2,483 [g.] (branchline)	31,164 [f.] kn (mainline) 21,206 [f.] kn (branchline)	10,913 [f.] kn (mainline)	3,712 [f.] kn (mainline)
Short Line Miles	45,361 [e.]	1,276 [g.]			

**Primary Elevators*

[a]. U.S. Department of Agriculture, National Agricultural Statistics Service. "Grain Stocks." pp. 29. Washington, D.C., January 1997.
[b]. 1997 Directory, Licensed and Bonded Country Elevators in North Dakota. pp. 173. North Dakota Grain Dealers Association, Fargo, 1997.
[c]. Canadian Grains Council. Statistical Handbook 96, Winnipeg, Manitoba, 1996.
[d]. Andreson, Scott and Kimberly Vachal. "Annual North Dakota Elevator Marketing Report, 1995-96." UGPTI Publication No. 110. Upper Great Plains Transportation Institute, North Dakota State University, Fargo, August 1996.
[e]. Policy, Legislation, and Economics Department, Railroad Facts, 1996 Edition, Association of American Railroads, Washington, D.C., September 1996.
[f]. Statistics Canada, Rail in Canada 1994, Ottawa, Ontario, December 1995.
[g]. North Dakota Department of Transportation. North Dakota Transportation Fact Book 1996, Bismarck, December 1996.

Agricultural producers in the northern plains region of the United States and the Canadian Prairie Provinces are important export wheat suppliers, accounting for more than half of the world wheat and wheat flour exports between 1984/85 and 1994/95 (Table 2). Their proximity, wheat types produced, and export facility locations make the United States and Canada competitors in the world markets and in each other's domestic markets. The wheat types grown in the north central United States and Canadian Prairie Provinces are hard red spring (HRS) and durum. The United States and Canada account for virtually all the world HRS wheat and have a limited number of competitors in the durum export market. These wheat

types are unique in their characteristics. HRS wheat is milled into a flour that is typified by high protein and strong gluten. It is used in products such as frozen dough, pizza crust, and bagels. Durum wheat is milled into semolina, a primary ingredient in pasta products.

Table 2. Export Volumes for Wheat

	Wheat & Wheat Flour — Avg tonnes, 1984/85 to 1994/95 —
Argentina	4,535 5%
Australia	12,850 14%
Canada	18,574 20%
European Union	19,208 21%
United States	33,084 36%
Total	92,970

Source: Food and Agricultural Organization of the United Nations

Beyond export volumes of HRS wheat and durum, disposition ratios provide a means for comparing the relative importance, and thus, the potential influences of domestic and export market demand for transportation and marketing systems in each country. As illustrated in Table 3, the export market for all wheat is relatively more important to Canada than to the United States. Canada depends on the export market for 68 and 77 percent of its wheat and durum wheat sales, respectively. The United States has varying degrees of dependence on the export market for its wheat types. Domestic use of durum is relatively important compared to the domestic market for HRS wheat. On average, the domestic market consumed about 44 percent of average annual durum use over the past decade. While this strong domestic market is positive for U.S. producers, it makes the country a primary target for other durum exporters. For United States hard red spring wheat, the situation is tied more closely to world market

export supply and import demand. Export sales of hard red spring wheat account for more than half of the average annual sales during the past decade.

Table 3. Disposition Ratios for Wheat and Durum Wheat, 1984/85 to 1993/94

	Wheat (other than Durum)	HRS Wheat	Durum Wheat	
	Canada	United States	Canada	United States
	- - - - - - - - -	*1,000 Tonnes*	- - - - - - - - -	
Production	22,864	12,600	3,850	2,564
Domestic Use	6,231	6,327	863	1,718
Exports	12,976	7,091	2,841	1,364
Exports as % of Total Use	68%	53%	77%	44%

Source: Canadian Grains Council; North Dakota Wheat Commission

Thus, as the number of competitors and the scope of substitutes is limited for HRS and durum wheats, the market interaction of these countries directly affects the world market for these products. Wheat production and disappearance data for the north central plains region of the United States and the Prairie Provinces of Canada illustrates the importance of a strong grain procurement and marketing system. The livelihood of producers in these regions depends on their ability to reach both domestic and export markets with competitively priced products.

Report Overview

The balance of this report will examine the experiences U.S. production agriculture has had with deregulation of the transportation industry. It will highlight the evolution of the procurement segment of grain marketing, concentrating on the wheat origination region, as it is an important export commodity for

both the Prairie Provinces in Canada and the upper plains region of the United States. First, an overview of the evolution of the grain procurement infrastructure and transportation industry in the United States will be provided. The Canadian system will then be viewed in a context of how it is poised for change.

U.S. EXPERIENCE WITH TRANSPORTATION DEREGULATION IN GRAIN PROCUREMENT AND TRANSPORTATION

In examining the potential changes occurring in the Canadian grain transportation and procurement system, it is useful to review the state of the U.S. grain transportation and procurement system prior to regulatory reform and the ensuing changes resulting from deregulation. Although there were many differences in the pre-reform state of the U.S. system compared to the current Canadian system, there also were similarities. Moreover, in an increasingly competitive global market, the eventual transformation of the Canadian procurement and transportation system to a less-regulated state is likely.

History

Prior to the regulatory reform in the United States, the grain procurement and marketing system was essentially unregulated, while the grain transportation system was heavily regulated. The heavy regulation of the transportation industries created an encumbrance for both shippers and transportation providers. Industry analysts identified substantial societal welfare losses resulting from the continued regulation of the transportation industries. In fact, Friedlaender (1969) and Moore (1972) estimated that the welfare losses resulting from surface freight regulation were between $1.7 and $2.4 billion. They identified three types of problems resulting from transport regulation. These included (1) the inefficient operation of the various modes (rail and trucking), (2) a shift of traffic to the less efficient mode due to regulatory rate structures, and (3) freight rates so high that some potential shipments were lost.

Because grains are low-valued, bulky commodities and because of the long distances from producing regions in the upper great plains to major terminal markets, rail is often the most efficient mode for transporting grain. Thus, rail regulatory reform that has occurred in the United States has had a large impact on U.S. grain shippers. For this reason, U.S. railroad deregulation is highlighted in detail.

In the early 1970s, with the nation facing the imminent bankruptcy of six of its major railroads, the poor health of the U.S. railroad industry became apparent to all. Rail's share of intercity freight ton-miles had dropped to 39.8 percent in 1970 from a high of nearly 75 percent of freight ton-miles in 1929 (AAR, 1996). Further, return on investment in the railroad industry hovered between 1.7 and 2.7 percent throughout the 1970s, compared to much higher returns in other industries (AAR, 1996). Finally, the U.S. Department of Transportation (USDOT) indicated in a 1978 report that more than $4 billion worth of deferred maintenance and delayed capital expenditures had been accumulated by Class I railroads by 1976 (General Accounting Office, 1990). Financial statistics such as these turned the nation's attention to railroads in the 1970s.

It was argued that the heavy regulations placed on railroads were responsible for many of these problems. The USDOT compiled a list of regulatory policies that it believed were responsible for the problems. These included (1) lengthy abandonment hearings, forcing rail carriers to operate on lines that were not profitable, (2) a lack of flexibility in rate making, discouraging innovation in pricing and service, which resulted in lost traffic to competing modes, (3) lengthy merger proceedings, slowing down some of the eventual cost savings from such mergers, and (4) prohibition of joint usage of track, leading to service duplication and high costs. Other problems in the industry that appeared to be the result of regulation included inflexible management, outdated operating procedures, and a lack of intermodalism and innovation in the industry. The following paragraphs will highlight the regulatory changes occurring in the industry and include a review of the impacts of railroad deregulation in the United States. Next, models

that show the characteristics of areas where grain elevator and rail rationalization have occurred in the United States will be presented. The rationalization model will provide insight into the potential nature of the Canadian grain transportation and marketing system in the event of their deregulation.

There have been two major changes in the regulation of U.S. railroads since 1975. These include the Railroad Revitalization and Regulatory Reform Act (4-R Act) of 1976 and the Staggers Rail Act of 1980. The 4-R Act, which was aimed at restoring the financial viability of the U.S. rail system, had three major provisions, including (1) allowing the Interstate Commerce Commission (ICC) to regulate only the rates where market dominance exists, (2) allowing railroads exemption from regulation on services where it is not considered necessary for transportation policy, represents an undue burden, and serves little useful purpose, and (3) directing the ICC to determine standards for determining revenue adequacy (General Accounting Office, 1990). Although the reforms made by the 4-R Act were useful, the rail industry continued its decline. This stimulated a push to further deregulate the industry, culminating in the passage of the Staggers Rail Act of 1980. In the Staggers Act, Congress (1) directed the ICC to consider revenue adequacy in setting maximum reasonable rate standards, (2) restricted rate bureaus to collective rate making on joint movements of goods, (3) permitted automatic adjustments in rates without challenge, (4) permitted further adjustments for railroads not achieving revenue adequacy, (5) allowed railroads to enter into confidential contracts with shippers, (6) set time limits on the abandonment and merger processes, and (7) changed the minimum rate standard to incremental costs (General Accounting Office, 1990 and National Economic Research Associates, 1986).

Previous Research

Several studies have assessed the impacts of railroad deregulation on railroad rates, railroad productivity, railroad profitability, rail-line and grain elevator rationalization, and rail union labor. A number of studies have examined the impacts of railroad deregulation on railroad rates. Studies using aggregate

industry data to assess the direct impacts of deregulation on rail rates have found mixed results. Boyer (1987) and Bitzan (1994) found slight increases in rail rates, while Barnekov and Kleit (1988) found a decrease in rates. Studies assessing the direct impacts of deregulation on the rates for specific commodities also have found mixed impacts. MacDonald (1989) found a decrease in rail grain rates, while Atkinson and Kerkvliet (1986) found increases in rail coal rates. While the results of the direct impacts of deregulation on rates have been mixed, most studies have found large reductions in rail rates resulting from increased lengths of haul, system density, and shipment size. To the extent that deregulation has increased shipment length and size, and system density, the direct impact of deregulation understates the negative impact on rates.

Other research on the impacts of railroad deregulation on rates suggests that the impacts have been asymmetric across commodities and regions. In one of the most comprehensive studies on the impacts of deregulation on rates, Wilson (1992) found that the initial impacts of deregulation were to increase rates for some commodities, decrease rates for others, and to leave rail rates for some commodities unchanged. He found that by 1988, rates on most commodities had decreased as a result of deregulation.

The effects of deregulation on rail rates have likely varied within commodity segments, but these relationships have not been addressed in transportation deregulation studies. A switch from a uniform rate-setting environment to a more flexible rate-setting environment likely produced rate increases in captive regions and decreases in competitive regions, as sellers are allowed to segment market demand and price accordingly. In the post-deregulation environment, differential pricing has allowed carriers to retain competitive traffic, which gains revenues for a portion of common system costs. Consequently, the result has been lower rates for non-competitive traffic to achieve revenue adequacy.

The impacts of railroad deregulation on railroad productivity also have been well-documented. The USDOT estimates that the rate of multifactor productivity growth averaged 3.9 percent per year between 1958 and 1991, while it averaged 4.8 percent between 1979 and 1989 (after deregulation) (Bureau of Transportation Statistics, USDOT, 1995). Dooley et al. (1991) estimate that prior to railroad deregulation, productivity growth led to approximately a 1 percent decrease in costs per year. Following deregulation, the rate of cost reductions resulting from productivity growth ranged from 5 to 7 percent until the growth rate fell slightly in 1987. Several other studies also have shown similar increases in productivity.

Another impact of deregulation, that has contributed to productivity gains in the rail industry, is an acceleration in rail-line abandonment. Prior to deregulation, railroads were forced to operate in many unprofitable markets. Since deregulation, U.S. railroads have abandoned more than 33,000 miles of rail line. This trackage represents approximately 18 percent of the total miles of road operated by Class I and II railroads at the end of 1979. To the extent that shippers have lost rail service, there have been impacts in terms of increased transportation costs to shippers, highway impacts on surrounding roads, and economic impacts to communities. However, in many cases, rail abandonment has occurred in communities with many transportation options or in communities that were declining prior to abandonment. Moreover, to the extent that rail abandonment has improved carrier viability and efficiency, other shippers have benefitted.

Just as their has been an acceleration in rail-line abandonment resulting from railroad deregulation, there also has been an acceleration in grain elevator rationalization. Although unit-train railroad rates were first introduced for shipping coal on the eastern seaboard in the 1960s, the widespread use of unit-train rates on grain did not occur until the 1980s. It is likely that the new pricing flexibility provided by railroad deregulation was a catalyst in a trend toward unit-train shipments. To take advantage

of the new pricing incentives provided for shipping in larger car blocks, grain elevators in the United States have consolidated. In many cases, subterminal-satellite systems have developed. Small gathering elevators ship to a large facility to take advantage of shipment savings associated with high volumes. Vachal (1995) shows that the number of grain elevators in North Dakota has dropped from 589 in 1979 to 484 in 1994. Furthermore, the number of N.D. elevators that are able to handle 50 or more cars has increased from eight to 112, and the average storage capacity has more than doubled over the same period.

Railroad profitability also has increased following deregulation. Unlike the regulatory reform that occurred in other U.S. industries, the deregulation of the railroad industry was pursued primarily for the benefit of the industry. Bitzan (1994) estimates that railroad return on investment has increased by more than 2 percent as a result of deregulation. Given the large productivity gains and increased pricing flexibility provided by deregulation, this result is not surprising.

Finally, studies showing the impacts that deregulation has had on railroad labor earnings and employment have been mixed. Hendricks (1994) and Bitzan (1997) find that railroad worker earnings premiums have increased as a result of deregulation, while Talley and Schwartz-Miller (1996) find that railroad worker earnings have decreased as a result of deregulation and the decrease is not spuriously related to deregulation. In measuring the employment impacts of railroad deregulation, Hsing and Mixon (1995) and Bitzan (1997) find sharp decreases resulting from deregulation, while Winston (1993) reviews evidence that suggests no change occurring in railroad employment from deregulation.

While there are several factors that are dissimilar when comparing the situation in the United States prior to railroad deregulation to the current situation in Canada, there also are some similarities. Dissimilarities between the current Canadian system and the pre-deregulation U.S. system include: a lower number of transportation alternatives available to Canadian shippers than existed in the United

States, a greater degree of regulation of the grain marketing system in Canada compared to that which existed in the United States, and a much smaller commodity mix available to Canadian railroads than what was available to U.S. railroads. Similarities between the current Canadian system and the pre-deregulation U.S. system include: a uniform (arbitrary, cost-based) rate structure, a large number of unprofitable branchlines, a large number of small capacity grain elevators, and unprofitable railroads. The following sections examine models of branchline and grain elevator rationalization in the United States. These models will provide insight into the type of areas where rail-line rationalization and grain elevator rationalization may occur in the Prairie Provinces under the conditions of a less regulated grain transportation and marketing system.

Rail-Line Rationalization

One of the results of transportation deregulation in the United States has been an acceleration in the miles of rail-line rationalization. Prior to deregulation, rail carriers were burdened by lengthy abandonment hearings, often lasting several years. The Staggers Rail Act (SRA) of 1980 set time limits on the abandonment process, making it easier for railroads to shed unprofitable rail lines. Abandonment applications not contested were required to be approved within 45 days, while an overall limit of 255 days was imposed on the entire abandonment process (General Accounting Office, 1990). Since the passage of the SRA, more than 33,000 miles of rail line have been abandoned in the United States (Table 4, from Bitzan, Honeyman, Tolliver, and Casavant, 1995). This represents approximately 18 percent of the mileage operated by Class I and II railroads in the United States in 1979. Table 4 also shows that nearly 70 percent of the miles that were abandoned between 1980 and 1992 were abandoned prior to 1985. This suggests that U.S. railroads were quick to take advantage of the eased restrictions on abandonment and able to remove rail lines that had been unprofitable for an extended time.

Table 4. Railroad Abandonment by Filing Date [1]

Year of Filing	Miles Requested	Miles Granted	Miles Actually Abandoned	Percent of 1980 Class I and II Miles Abandoned
1979 & 1980	9386.53	8127.99	6915.79	3.7
1981	5234.87	4495.96	4091.51	2.2
1982	2302.90	2051.55	1883.20	1.0
1983	3927.32	3326.59	3134.08	1.7
1984	5162.89	4778.15	4105.92	2.2
1985	3270.54	2906.24	2724.05	1.5
1986	2445.82	2050.74	1866.52	1.0
1987	2307.96	2200.65	1827.79	1.0
1988	3009.04	2609.78	2031.56	1.1
1989	1713.94	1380.12	1289.43	0.7
1990	1834.83	1683.43	1457.29	0.8
1991	1926.80	1844.29	1608.90	0.9
1992	325.58	260.65	260.65	0.1
1979-1992	42,849.0	37,716.1	33,196.7	17.7

Rail-Line Abandonment Model

This section of the study presents a statistical model to explain the characteristics of areas where railroad abandonment is most likely to occur. The model was developed by Bitzan, Honeyman, Tolliver, and Casavant (1995) from a nationwide U.S. database on rail lines abandoned by county between 1980 and 1992. The model is presented here because of its relevance to the potential changes taking place in the current Canadian rail system. Although there are distinct differences between the Canadian and U.S. transportation systems, some insight into potential Prairie Province changes may be gained, because the

[1]The rail abandonment database contains rail abandonments where decisions were granted after January 1, 1980 and were filed before March 27, 1992.

characteristics for likely/unlikely abandonment areas may be similar for the two systems. Thus, the model will provide an understanding of the areas in the Prairie Provinces that are most at risk for losing rail service.

Clearly, the incidence of rail abandonment is reflective of unprofitable rail lines. However, other factors are likely to influence the railroad's decision to abandon a rail line, and the probability that the railroad's decision will be approved. These factors include the political environment at the time of abandonment, and in the region, the strength of shipper opposition to the abandonment and the potential for future profits on the rail line. To gain insight into some of the factors that may influence the probability that a rail line will be abandoned, a simple logistic model of the proportion of miles abandoned by county is formulated.

Model Definition

This model will show the importance of underlying factors in determining the incidence of abandonment and may serve as a predictor of rail abandonment, in the absence of detailed revenue and cost data. The log-odds proportion of rail lines abandoned by county can be estimated by a vector of variables affecting the demand for rail service. These variables include lagged values of the distance of the county center from barge-loading facilities, the density of the rail network in the county, the total value of agricultural and manufacturing shipments made out of the county per mile of railroad, the proportional change in the population of the county, and the proportion of total shipments that are manufacturing shipments. The proportion of shipments that are manufacturing also will affect the cost of serving particular areas. Specifically, the following model is used:

$$\ln\left(\frac{PCTMAB}{1-PCTMAB}\right)_{it} = \psi_1 + \psi_2 BDIST_{i,t-1} + \psi_3 RLDENS_{i,t-1} + \psi_4 MIGR_{i,t-1} + \psi_5 SHIPPR_{i,t-1} + \psi_6 MFGPRP_{i,t-1} + \epsilon_{it} + \mu_i + \lambda_t$$

where:

I	=	county
t	=	year
PCTMAB	=	proportion of rail miles abandoned in the county for the year
BDIST	=	average straight line distance to the nearest barge-loading facility from the state where the county is located
RLDENS	=	density of the rail network in the county (miles of road per square mile)
MIGR	=	proportional change in population from five years before the current year for the county
SHIPPR	=	total value of agricultural and manufacturing shipments per mile of railroad in the year for the county
MFGPRP	=	proportion of the value of shipments that is from manufactured products for the year and county
μ_i	=	error term due to county effects
λ_t	=	error term due to time effects

This model is estimated using the pooled time-series/cross-sectional data set of U.S. counties between 1980 and 1991[2,3]. The model is estimated as an error components model, where the intercept term is allowed to vary over time and over counties[4]. In the error-components model, the county and time effects are random variables. Thus, the error term has three components: one component that is the normal error term, one component due to time effects, and one component due to county effects.

The log-odds model is likely to provide a better fit than a linear model. The log-odds model also provides results consistent with intuition, as it will not predict that more than 100 percent or less than 0

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[2]Only those counties that had rail lines in 1980 are included in the sample.

[3]1992 abandonments are not included since the full year of data is not available.

[4]Variance components are estimated by the method suggested by Fuller and Battese (1974).

percent of the county's miles will be abandoned. On the other hand, the linear model may predict that more than 100 percent or less than 0 percent of a county's miles will be abandoned.

In this model, lagged values are used to avoid problems with endogeneity of right-hand side variables. If the characteristics were present prior to the filing of the abandonment petition, it is safe to say that these characteristics were not caused by the abandonment[5]. In the estimation, the density of rail coverage is expected to have a positive sign, *a priori*. Counties that are more densely covered by rail lines are likely to have duplication of service and thus, are more likely to have abandonments. The distance from barge-loading facilities is expected to have a negative sign, as a greater distance from barge facilities suggests less transportation competition. The proportional population change from the previous five years also is expected to have a negative sign, *a priori*. If population growth serves as a proxy for changes in economic prosperity, then an increase in population growth would suggest that abandonment is less likely.

Total shipments per mile should have a negative influence on rail abandonment, as fixed costs per mile are spread over more shipments. The proportion of county shipments attributed to manufacturing are expected to positively impact rail abandonment. Rail has an inherent advantage in hauling bulky, low-value commodities. Therefore, as manufactured goods account for a relatively larger share of the traffic originated from a county, rail abandonment is more likely.

Model Results

[5]However, if the railroad has made a conscious decision to downgrade the line prior to its filing, it is possible that this decision has influenced right-hand side variables. Thus, some simultaneity bias may still exist in the model. Nonetheless, data regarding rail-line downgrading prior to abandonment is not available.

Model results are presented in Table 5. In this estimation, all the variables have the expected signs, and nearly all are significant at the 5 percent level. The estimation shows that transportation competitiveness is an important determinant of the proportion of miles that are abandoned in a county, as is evident by the statistically significant effects of distance from barge loading facilities (BDIST) and the density of rail coverage (RLDENS). This estimation also provides support for the notion that at least some abandonments are endogenous with respect to the economic conditions of the county, as suggested by the negative and significant sign on the proportional change in population.

Table 5. Error Components Estimation of ln (pctmab/1-pctmab)

Variable	Parameter Estimate	t-ratio
Intercept	-8.8228	102.00
BDIST	-0.0003	3.21
RLDENS	2.1999	16.98
MIGR	-0.6333	4.78
SHIPPR	-0.0000004	1.19
MFGPRP	0.0583	1.60
# of observations = 34,278		

Implications

Although this estimation was developed with U.S. data, it sets a precedent for discussing the potential changes in the Prairie Province rail system if deregulation of the Canadian grain transportation and marketing systems occurs. The importance of transportation competitiveness in determining the proportion of an area's rail lines abandoned suggests that the parts of the Prairie Provinces likely to

experience the heaviest abandonment are those in close proximity to the U.S. rail and highway systems and those with a large number of branch lines. The areas of the Prairie Provinces that currently are experiencing economic and population declines and areas with less dense grain production are also more prone to experience large amounts of rail abandonment.

One option for continuing rail service on light-density branchlines is short-line operation. The U.S. experience also has shown that short-line railroads often have been able to operate profitably over low-density rail lines, where previous Class I operation was not profitable. Savings in labor costs, capital costs, and maintenance of way costs have allowed short-line operators to realize profits on many such lines in the United States. However, just as railroad abandonment is more likely to occur in transportation competitive areas, short-line operations are less likely to be successful in transportation competitive areas. Thus, it is likely that in the most transportation competitive areas of the Prairie Provinces, the preponderance of unprofitable light-density lines will be abandoned, rather than operated by short lines. Moreover, to the extent that province-specific successor rights laws for labor remain in place, short-line operations of light-density lines in such provinces are likely to be limited.

Grain Elevator Rationalization

Since the widespread introduction of multi-car and trainload rates on grain, the U.S. grain elevator system has consolidated into a smaller number of high capacity train-loading facilities. In North Dakota alone, the number of licensed grain elevators has declined by nearly 18 percent, and the average storage capacity has more than doubled since 1979. This section of the study presents a model of grain elevator survival time to show the types of factors that influence elevator rationalization and consolidation.

As in the abandonment model presented in the previous section, differences in the Canadian and U.S. grain transportation and marketing systems are likely to create differences in the magnitude of the

impacts of various factors on elevator rationalization. Nonetheless, the factors influencing elevator rationalization and the direction of their influence are likely to be similar between the two systems.

Model Definition

This study uses data on North Dakota grain elevators operating in 1987 to estimate an accelerated failure time model. This model allows us to identify characteristics that contribute to elevator sustainability. A model of North Dakota is used because of the many similarities between the state and the Prairie Provinces, and because of data availability. The accelerated failure time (AFT) model estimates the log of existence time as a function of the explanatory variables:

$$\ln T_i = \beta_0 + \beta_1 x_{i1} + \ldots + \beta_2 x_{ij} + \sigma\epsilon_i$$

where: T_i = time from start of study period to closing time for elevator I

x_{ij} = explanatory variable j for elevator I

ϵ_i = random error term

Specifically, the time between the beginning period (1987) and the time a grain elevator closes is hypothesized to be a function of several factors, including the storage capacity of the elevator, the types of services provided by the elevator, the diversity of products handled by the elevator, the number of bushels handled by the elevator, the amount of grain handled per elevator in the county, the proportion of the elevator's shipments made by truck, and whether the elevator is owned by a large grain company or independently owned. The specific functional form is as follows:

$$\ln T_i = \beta_0 + \beta_1 CAPAC_i + \beta_2 SERV_i + \beta_3 COUNC_i + \beta_4 BUSHELS_i + \beta_5 BUSHPE_i + \beta_6 TRKPCT_i + \beta_7 LGCOMP_i + \sigma\epsilon_i$$

where: $CAPAC_i$ = storage capacity of elevator I in bushels

$SERV_i$ = number of extra services provided (e.g. seed, fertilizer)

$CONC_i$	=	concentration index for the diversity of grains handled (1 = one grain only, 0 = wide diversity in grains handled)
$BUSHELS_i$	=	bushels of grain handled by the elevator
$BUSHPE_i$	=	average bushels of grain handled by the elevators in the county
$TRKPCT_i$	=	proportion of the elevator's grain shipped by truck
$LGCOMP_i$	=	dummy variable for elevators owned by large grain companies (1=yes, 0=no)

In this model, elevator capacity, number of extra services provided, bushels handled, and average bushels handled by county elevators are expected to have positive signs, while the grain concentration index, proportion of an elevator's grain shipped by truck, and the dummy variable for elevators owned by large companies are expected to have negative signs, *a priori*. Elevator storage capacity is expected to have a positive sign because of its expected negative impact on grain handling costs. To the extent that grain elevators realize economies of size in grain handling and volume discounts through large shipments, larger capacity elevators are expected to realize lower per bushel costs and thus, have a longer survival time, holding other factors constant. The number of extra services provided is expected to have a positive sign for the same reason that the grain concentration index is expected to have a negative sign in this estimation. The wider the range of products and services provided by a particular grain elevator, the less susceptible the elevator will be to the reductions in the demand for a particular type of grain or service. Bushels handled are expected to have a positive sign due to economies of utilization realized by grain elevators. The greater the turnover experienced by a given grain elevator, the lower the per unit costs. Average bushels handled by elevators in the county are expected to have a positive sign, as a greater number of bushels per elevator in the county suggests less potential for cross-country competition. The proportion of an elevator's shipments handled by truck is expected to have a negative sign, because elevators that are more reliant on trucking for transporting their grain are likely to pay higher

transportation costs per ton-mile and may not have access to high-end markets. Finally, the dummy variable for large company ownership is expected to have a negative sign, since large grain companies are likely to have better access to information, more resources available for consolidating, and less loyalty from the local community.

Before estimating this model, it should be mentioned that there is one unique characteristic about these data, when compared to data typically experienced in statistical analysis. For many grain elevators, the time between the start of the study period and the closing period is not observed. That is, many of the elevators in existence in 1987 are still in existence today. This problem, known as right censoring, presents special statistical problems that cannot be dealt with adequately through ordinary least squares estimation. Thus, the model is estimated using maximum likelihood techniques. Maximum likelihood estimation uses the basic principle of maximizing the likelihood of observing the various failure times given the values of the explanatory variables. It consists of two steps: (1) constructing a likelihood function - choosing an appropriate distribution for the dependent variable and an appropriate functional form, and (2) maximization of the likelihood function.

To examine the appropriate distribution for the dependent variable (years before closing), likelihood ratio tests are performed by estimating models with several distributions. Since the Weibull, exponential, and log-normal distributions are all nested in the generalized gamma distribution, each can be expressed as the generalized gamma with certain restrictions imposed. The appropriateness of the various distributions are then tested by performing the likelihood ratio test on the various restrictions imposed. Table 6 shows the likelihood ratio tests for each distribution. As the likelihood ratio tests show, the exponential and Weibull distributions are significantly different from the more general Gamma distribution. The log-normal model is not significantly different from the Gamma distribution. This suggests

that the error term is distributed normally, has a constant variance, and is independent across observations.

Table 6. Likelihood Ratio Tests for the Appropriate Distribution

Likelihood Ratio Chi-Square Test	Test Statistic
Exponential vs. Generalized Gamma	16.01*
Weibull vs. Generalized Gamma	10.07*
Log-Normal vs. Generalized Gamma	2.11

*significant at the 1 percent level

Model Results

Table 7 presents the results of the estimation of the accelerated failure time model for North Dakota grain elevators. As the table shows, all the variables have signs that are consistent with prior expectations, and four out of the seven are significant at conventional levels. To interpret the coefficient estimates for 1-0 variables, we take e^{β} to get the estimated ratio of the expected survival times of each group. Thus, the parameter estimate for LGCOMP shows the expected survival time for elevators owned by large companies to be 40 percent of those that are individually owned, when controlling for other factors. The parameter estimate for CAPAC suggests that each additional bushel of storage capacity increases survival time by .12 percent, when holding other factors constant. The parameter estimate for CONC suggests that increasing the concentration index for grains handled from 0 to 1 decreases survival time by more than 60 percent, when holding other factors constant. Lastly, the parameter estimate for BUSHELS suggests that increasing the yearly number of bushels handled by 1,000 increases survival time by .06 percent, when holding other factors constant.

Table 7. AFT Estimation of ND Grain Elevator Survival Time

Variable	Parameter Estimate	Chi-Square Statistic
Intercept	3.3227	59.39*
CAPAC	0.0012	5.56**
SERV	0.00002	0.52
CONC	-0.9725	6.45**
BUSHELS	0.0000006	10.65*
BUSHPE	0.0000001	0.25
TRKPCT	-0.1398	0.28
LGCOMP	-0.9079	11.34*

Scale Parameter = 1.2563
Likelihood Ratio Chi-Square Test for Joint Significance of All Independent Variables = 185.30*
Log Likelihood = -222.7589
*significant at the 1 percent level
**significant at the 5 percent level

As the Canadian elevator industry is just beginning its quest for efficiencies in a less-regulated market, insight into the evolution of the N.D. elevator industry may be valuable. However, the continued dominant role of the Canadian Wheat Board in originating and distributing grain will continue to drive change in the grain procurement system.

CANADIAN GRAIN PROCUREMENT AND TRANSPORTATION

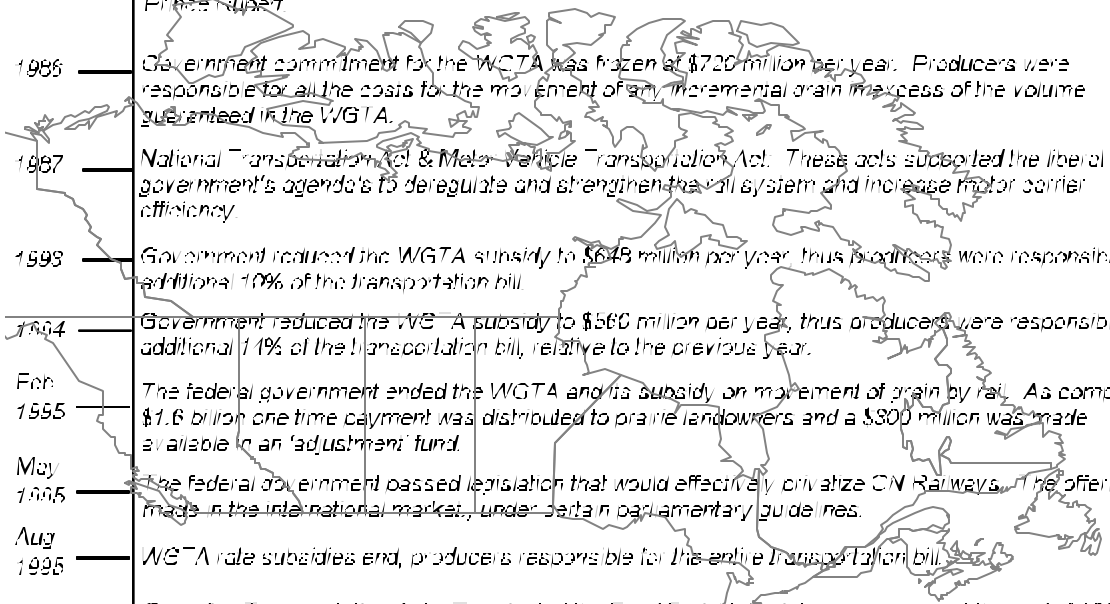
"The Canadian system is approximately 20 years behind the grain movement system now operating in the United States. Deregulation started in the United States with the Staggers Act of 1980, but significant changes in Canada are not expected until the year 2000 (Wallace, 1997)." In comparison to its U.S. counterpart, the Canadian government is still heavily involved in the fundamental components of its grain procurement system. This control of grain marketing from procurement to export has allowed Canada to differentiate itself in a competitive world grain market. Over recent years, however, the government budget constraints and public discontent have brought attention to the economic benefits/costs of this regulated grain marketing system.

History

Canada, as many other major wheat exporters, was forced to take control of its grain marketing and transportation when World War II closed off sales to Europe and created a world wheat surplus. The Canadian government established the Canadian Wheat Board in 1935 as a market alternative for western wheat producers. In 1942, the Canadian Wheat Board was given control of the rail car allocation for grain. Its power was extended in 1943, when the government of Canada established that the Wheat Board would be the single marketer of western Canadian wheat, as a means of stabilizing prices and supply.

The Canadian government provided mainline upgrades and some elevator rationalization during the 1970s, in response to concerns about how its grain handling and transportation system may affect Canadian success in the growing world wheat trade. The responsibility of allocating

Canadian Government in Grain Transportation



1885 — Privately owned CP Railway completed its rail line, extending from Quebec to Alberta.

1897 — Crows Nest Pass Agreement: CP Railway agreed to (1) move flour & grain to the east and settlers to the west at reduced rates and (2) haul export grains to Thunder Bay at reduced freight rates ("Crow Rates"), and (3) extend its rail line from Lethbridge Alberta through Crowsnest Pass to Nelson British Columbia in exchange for a $3.4 million dollars in financial assistance.

1925 — Canadian National Railway was formed and became a Crown Corporation when parliament joined several insolvent railroads and formed a single railroad.

Railway Act of 1925: Made Crow Rates statutory and extended the rates to the CN. It also extended the Crow Rates to include export grain and flour moving to Vancouver, Prince Rupert and Churchill.

1984 — Western Grain Transportation Act (WGTA): The WGTA replaced the Crow's Nest Agreement. Under this Act the federal government provided each railroad with an annual payment, the 'Crow Cap' payment, to cover transportation costs of eligible grains from the Prairie provinces to Thunder Bay, Churchill, Vancouver, and Prince Rupert.

1986 — Government commitment for the WGTA was frozen at $720 million per year. Producers were responsible for all the costs for the movement of any incremental grain in excess of the volume guaranteed in the WGTA.

1987 — National Transportation Act & Motor Vehicle Transportation Act: These acts supported the liberal government's agenda's to deregulate and strengthen the rail system and increase motor carrier efficiency.

1993 — Government reduced the WGTA subsidy to $648 million per year, thus producers were responsible for an additional 10% of the transportation bill.

1994 — Government reduced the WGTA subsidy to $560 million per year, thus producers were responsible for an additional 11% of the transportation bill, relative to the previous year.

Feb 1995 — The federal government ended the WGTA and its subsidy on movement of grain by rail. As compensation $1.6 billion one time payment was distributed to prairie landowners and a $300 million was made available in an 'adjustment' fund.

May 1995 — The federal government passed legislation that would effectively privatize CN Railways. The offering to be made in the international market, under certain parliamentary guidelines.

Aug 1995 — WGTA rate subsidies end, producers responsible for the entire transportation bill.

1995 — Canadian Transportation Act: Terminated the Feed Freight Assistance program at the end of 1995 and directed the Canadian Transportation Agency to oversee rail rates through 1999. In addition, the government announced its intention to abolish the Western Grain Transportation Office (formerly the Grain Transportation Agency) and end government ownership of rail cars.

Oct 1995 — Policy Statement issued: Recommendations included changes related to CWB structure, governance, and accountability, changes related to more flexible operations and improved cash flow, and changes related to the CWB's marketing mandate and the empowerment of farmers.

March 1997 — Vote on dual marketing of barley: Canadian Wheat Board received 62 percent of the vote in favor of maintaining the current marketing system.

1999 — A review is scheduled to take place which addresses and analyzes issues such as elimination of the maximum rate scale, movement from farm gate to export facility, railroad productivity, and shipper costs.

rail cars for grain and making terminal pooling arrangements was turned over to the newly established Grain Transportation Agency in 1980. The Government Transportation Agency initiated car deliveries and directed pooling arrangements under government mandated and government subsidized rail transportation rates for 15 years.

Starting with the Crow's Nest Pass Agreement in 1897 and continuing until Aug. 1, 1995, Prairie farmers were subsidized for their grain transportation. A large number of products, including wheat and barley, received the subsidy. For many years, until discontinuation in 1995, the portion of freight rates paid by the government had been decreasing annually. During the final year of the Western Grain Transportation Act (WGTA) the government paid approximately half the cost to ship grain to offshore export positions. After the WGTA was removed in August 1995, freight rates nearly doubled for producers. Farmers who produced farthest from port saw larger increases in shipping costs. A single payment was made to the farmers for the loss of the subsidy, but the effects of the loss have not been fully felt due to higher grain prices in 1995-96.

The impetus for rationalization of the Canadian railroads began in the 1980s. Although the National Transportation Act (1987) in Canada paved the way for railroads to abandon their track, only 4 percent of total track miles could be abandoned per year. Protection against abandonment and time consuming procedures have slowed down Canada's rationalization (Meyer, 1993). On July 1, 1996, new procedures for abandonment were put in place to facilitate the abandonment process.

Canadian Rail System

Class I rail carriers include Canadian National, Canadian Pacific Limited and VIA Rail Canada Inc., and their subsidiaries. Other carriers involved in Canadian rail transport operations are categorized as Class II. Companies considered Class III report under the Railway Act, such as terminal, bridge and terminal companies. Regional and short lines are two descriptive types of railways. A 1985 *Report of the*

Inquiry into Railway Branch Lines (Canadian Transport Commission, 1985) defined short lines as a company, under federal or provincial jurisdiction that uses branch lines connected with main line carrier tracks, that acts as a feeder service to or from the main line track, where the owner expects economic profit. Short line railroads are a relatively new phenomenon in the Prairie Provinces. Provincial and federal disincentives for Class I line sales have limited the opportunities for the creation of short-line railroads on light-density lines.

According to the Railway Association of Canada (1996), successful short lines are able to operate low volume lines at a lower cost than major railways and can earn a profit while providing local shippers more personalized service. These factors are required for survival by the farmers and wheat pools. Many short lines can increase their business substantially by incorporating high customer service standards into their daily operations (Gormick, 1995).

Prairie Elevator System

Elevators in Canada can be categorized into four types: primary, terminal, process, and transfer. A primary elevator is used mainly for storing or forwarding grain received from farmers. Processing elevators store and receive grain for manufacturing or processing into other products. Terminal and transfer elevators transfer grain that has already been inspected and weighed. Eastern division transfer elevators and terminal elevators also are used for cleaning and storing grain. The majority of primary elevators are owned by eight companies, four cooperatives and four private companies. The cooperatives are Alberta Wheat Pool, Saskatchewan Wheat Pool, Manitoba Pool Elevators, and United Grain Growers. Private companies are Pioneer Grain, Cargill Limited, N.M. Paterson and Sons, and Parrish and Heimbecker.

An important development occurring on the Prairies has been the construction of several high-volume inland terminals. The new elevators offer high-speed loading and unloading facilities, fast grain

cleaning capabilities, unit train loading ability, and substantial storage space. As these new elevators are positioned across the Prairie Provinces, older country elevators are displaced in the procurement and marketing process. The option does remain to maintain the older elevators as trucking satellites or subterminals, but it is likely that many of the facilities will be closed**.** In regard to Kraft's (1996) expected primary elevator numbers, future figures were listed as 800 elevators in the year 2000, then declining to 300 to 400 elevators in 15 years (2011).

The survival model presented earlier in this report sets forth seven factors that contributed to elevator industry rationalization and consolidation in North Dakota. Model results indicated that the more capacity an elevator possesses, the lower the cost per bushel in regard to handling and volume discounts, the longer the elevator is expected to remain in existence. The same rationale holds for number of bushels handled. In respect to large grain companies versus independently owned, large companies are expected to obtain longer survival times due to better technology and a larger amounts of available capital. For the Canadian system, these factors may prove to contribute to more substantial rationalization, barring government intervention. In assessing the predicament of the Canadian grain procurement industry, it is important to consider how it will attempt to gain efficiencies in competing with a more mature U.S. grain procurement industry in the context of a rather regulated marketing system.

Canadian Grain Marketing

Farmers first have to decide where and how to ship their grain off the farm. Depending if the commodity is Board, non-Board, or off-Board, the shipment may be limited to specific delivery destinations. Board grains consist of wheat, durum wheat, and barley intended for export or utilized for domestic human consumption. All Board grains are marketed exclusively by the CWB. Off-Board grains include wheat and barley not for export or human consumption. Uses include feed, and marketing can be

performed by either the CWB or a private firm. The remaining grains are categorized as non-Board and include oats, rye, flaxseed, and canola. Sales of non-Board grains are unrestricted; buyers can include livestock farmers, feed mills, processing plants, or elevators.

Farmers have little influence on the disposition of Board grains. Farmers deliver their grain to primary elevators, at times specified by the Board, receiving an initial payment. Payments can vary by location, depending on freight costs to alternative terminal destinations. Only grain of the same varieties can be mixed in the same cars and storage bins. If there is a monetary surplus after administrative costs have been covered at the end of the crop year, farmers receive another check called a "final payment."

Canadian Wheat Board

Currently, the Canadian Wheat Board is responsible for marketing all wheat and barley produced in the Prairies and destined for export or for human consumption in Canada. After the Western Grain Marketing Panel (WGMP) recommended changes in the barley marketing system, a referendum of procedures was conducted. Ballots were counted in March 1997. Nearly 63 percent of barley farmers voted in favor of maintaining the current marketing.

Initially, the WGMP was formed due to issues that included new trade agreements [Canada-United States Free Trade Agreement (CUSTA), North American Free Trade Agreement (NAFTA), General Agreement on Tariffs and Trade (GATT)], Canada-United States border issues regarding trade, expected future roles of the Canadian Wheat Board, Winnipeg Commodity Exchange, Canada Grain Council, the Pools and multinational firms; and removal of the transportation subsidies on movement of export grain. The objective of the Panel was to examine western grain marketing issues. Many recommendations were given by the Panel. Proposals include changes made to the *Canadian Wheat Board Act*, which permit the CWB to change the structure of operation and allow greater flexibility for the farmers. Changes also are being considered in the marketing of wheat and barley.

The authors' (Kraft et al., 1996) goal in *Performance Evaluation of the Canadian Wheat Board* is to review the marketing of wheat by the Canadian Wheat Board. Specific issues addressed include: pricing wheat, the value of single-desk selling of wheat, the Board's ability to obtain reduced marketing costs, the effectiveness of the CWB in a changing marketing environment, and the purpose of the Board and its use by owners.

The study found that single-desk marketing of wheat was advantageous because of the Board's ability to extract price premiums in selected markets. Attributes that enhance sales of CWB wheat are high quality, reliability, support services, credit, diversity of suppliers, and consistent product. Export subsidies of competing exporters also play a role by accentuating premiums in unsubsidized markets. The CWB is said to have lower costs for their risk management than are observed for non-Board commodities.

In *The CWB and Barley Marketing*, Schmitz et al. (1997) evaluated the economic performance of the CWB in selling feed and malting barley. Previous studies were compared and critiqued. The impact of introducing multiple sellers also was shown. The single seller returns produced a better return, on average, to producers. The report concludes that the current single-desk selling of barley is more profitable than multiple sellers. The rationale is that the CWB can exercise market power in the sale of Canadian grain.

The study by Carter and Loyns (1996) titled *The Economics of Single Desk Selling of Western Canadian Grain* concluded, to the contrary, that Canadian producers would be better served by a competitive marketing system. Carter and Loyns find the CWB to be a hindrance to farmers and a cost burden to tax payers. They found no price premiums on Board grains and draw attention to situations where the CWB did not sell grains at their appropriate grade level, reducing returns to Canadian farmers.

Differences in the two previous studies produced varying results. Carter and Loyns (1996) identified extra marketing costs resulting from the CWB's single desk marketing. Although Schmitz et al. (1997) acknowledges some of these costs, they argue that farmers would incur these costs under any marketing. Another difference exists in the area of data. Schmitz et al. (1997) were allowed to use data provided directly from the CWB. Carter and Loyns (1996) were able to use public CWB data and other findings, including surveys, models, and published information. While the benefits and disadvantages of the CWB are likely to remain under scrutiny, it will continue to play a dominant role in near-term discussions of the Canadian grain procurement and marketing systems.

Car Allocation and Pooling Points

On Aug. 1, 1995, the Western Grain Transportation Act (WGTA) was repealed. The government eliminated the WGTA due to GATT requirements and budget considerations. At the same time, the Grain Transportation Agency (GTA) was eliminated. The GTA was an agency of the Canadian Government responsible for the movement of Western Canadian grain to export and domestic regions. For one year, until Aug. 1, 1996, Transport Canada conducted the operations of car allocation through the Western Grain Transportation Office (WGTA). The Car Allocation Policy Group (CAPG) was established Aug. 1, 1996, and has been responsible for allocating cars since that time. CAPG is an industry-led group dealing with car allocation policies for rate-regulated rail movements of western Canadian grains. Although the railways perform the actual car allocation, CAPG produces guidelines for allocation.

A Policy Issues Paper titled "Changing Canadian Grain Policies: Implications for Montana's Grain Industry" was prepared by Linda M. Young (1996). She summarized recent changes in the marketing system. Farmers deliver their grain to pools, which are accounts for specific wheat and barley grades. The dividing line between the east and west grain movements will be moving to the east. The western pooling point of Vancouver, British Columbia, will remain the same, while the Lower St. Lawrence in

Quebec has become the new eastern pooling point. The change in pooling points will result in higher costs for producers east of the dividing line. This will establish higher shipping prices for those producers utilizing the St. Lawrence Seaway.

Car allocation, which was previously handled by the Western Grain Transportation Office, is now being performed by CAPG. A method of zone allocation was nearly implemented. A total of 27 zones were designated, each comprising of six to 10 train runs. Train runs can vary in length, contain different maximum and minimum car limits, and adjust to changes made on each line. The railroads, CWB, and grain industry participants provide input for decisions, but the railroads have the final say due to operational considerations. All parties involved with the zone allocation method were not able to agree on changes in the train run allocation basis, so the plan has been placed on hold. The issue of railcar ownership also is uncertain. Parties interested in the fleet of cars include the railroads, shippers, and farmers. Management of these railcars is complex and costly. Research must be completed to calculate the best fit for ownership.

A review is scheduled for 1999 that will look at movements from the farm to exporting region. This will include analysis of both past trends and expected numbers in the future. The entire grain transportation and handling system will be analyzed, and the efficiency gains of railroads and shippers (Transport Canada, 1997). The fate of the maximum rate charge will be in question, which may be abolished by repealing part of the Canadian Transportation Act. Another grain system review is to be led by industry and involve comparison of revenue and cost performances. Many government and industry participants feel that both reviews may be completed as a combined effort.

Buy Back Option and Export Opportunities

Between September 1994 and September 1995, an agreement was in place between the United States and Canada to limit wheat imports into the United States. U.S. producers see high volume imports

as a threat to the price of their commodities. In 1982, the North Dakota Wheat Commission started monitoring imports from Canada. Import numbers continued to rise until a record-setting 90 million bushels were shipped in the 1993-94 marketing year. At that time, an investigation was conducted International Trade Commission. The result was in favor of U.S. producers, and a Memorandum of Understanding (MOU) was implemented between the Canadian and U.S. governments. Wheat and durum shipments to the United States were limited to a specific number of bushels before tariff rates were assessed. Although the MOU has not been renewed, government officials continue to monitor import levels. Currently no other quotas have been put into place. Recently, Canada made a comment stating that it would not accept any type of renewal of voluntary restraints similar to those of 1994.

The CWB can essentially control producer grain sales to the United States by setting the buy back price (Loyns and Kraut, 1995). The buy back price is the amount a producer pays to the Board to receive grain. The grain is then resold to a U.S. buyer, with the producer effectively acting as an agent of the Board. The CWB sets the buy back price sufficiently high, so the producer does not profit from exercising this option. Advantages can be seen to Canadian producers when the sale price to the United States is higher that the price charged by the CWB or the CWB underestimates the transportation cost.

Delphi Survey

The current situation in Canada is unprecedented, so it is not possible to forecast the effects of transportation reforms from historical data. For that reason, a Delphi survey will be used to assemble expert opinions about likely changes in Canada's rail and grain handling sectors. Delphi may be characterized as a method for structuring group communication so that the group can effectively deal with a complex problem (Linstone and Turoff, 1975).

Delphi studies have been used for many industries in the past. The Rand Corporation initially used Delphi for scientific and technological forecasting. More recently the Delphi technique has been utilized for topics ranging from natural resources to logistics. A study by Leitch et al. (1983) used the Delphi method to identify problems and issues relevant to the U.S. Geological Survey. Another study (Lynch et al., 1994) identified potential issues resulting from societal changes, and then predicted the future of logistics in Canada. The Lynch article compares their final results with those previously published in a similar North American logistics study. Tolliver (1989) also utilized the Delphi method while providing long-range forecasts of grain production. By using these forecasts, an analysis was done on the relationship between the increased use of subterminal elevators and acceleration of pavement deterioration.

Data Collection

The Delphi process, unlike other surveys, allows respondents to see previous answers of other respondents and adjust their answers accordingly. To begin the Delphi, a survey is designed, revised, then sent to a group of respondents. The results of the returned surveys are summarized, and then another questionnaire is prepared for the same group. Group results are presented, and respondents are given the chance to change previous answers. Iterations continue until a specified degree of consensus has been reached.

The Delphi process can involve differing numbers of steps and use varying approaches. According to Sackman (1975), “The end of the product is the consensus of experts, including their commentary, on each of the questionnaire items, usually organized as a written report by the Delphi investigator.”

Survey Design

For purposes of this study, a mail survey was deemed appropriate due to the distant locations of panel members. Background information on surveys was found in Dillman's (1978) "Mail and Telephone Surveys". Other survey layouts also were reviewed to find the most effective mix of question style and answer format.

The survey was divided into several subject areas: primary elevators, grain production, Canadian Wheat Board, barley market, wheat market, cooperatives, Prairie rail miles and Prairie short-line miles. Significant changes are possible in each of these areas, due to recent or prospective policy developments and economic pressures.

After consulting numerous sources, contacts were made with a panel of Canadian experts. Respondents were selected on the basis of their professional authority. Due to the limited number of potential panel members, a group of 10 participants was compiled. Different industries, government positions, and academicians were possible candidates for the group of respondents. Therefore, respondents have varying degrees of knowledge on each topic, depending on their background.

Survey Process

Before conducting the survey, approval was sought from the Institutional Review Board (IRB) at North Dakota State University. Changes were made to satisfy IRB requirements. The survey and cover letter were mailed in November 1996 to the 10 panel members. Within one month, eight completed surveys were returned with many helpful comments. The process to revise questions and summarize answers then began.

Follow-up phone calls were made to panel members to ensure delivery of the surveys packet and answer any questions. Most members returned their surveys in a timely manner, but a few additional phone calls were necessary in December and January 1997. By February all 10 participants completed the survey.

The 10 responses were gathered and presented in the original survey with minimal revisions of questions for the second round of the survey. Each respondent was listed by number (e.g., respondent three) to maintain confidentiality. Although responses were kept anonymous, Appendix A contains a list of participants, their positions, and company of employment.

Answers and comments were listed by the appropriate question. Again the IRB reviewed the revised survey and accompanying cover letter. After making the appropriate modifications, the packet was prepared and sent to the panel members.

Data Analysis Procedure

After the first round of surveys had been completed, all of the respondents' answers and comments were listed after each question. Participants had few, if any, changes from round one to round two. This provided evidence that the number of iterations would end with the completion of the second round. Answers to the second round will be considered the final result. Due to the low number of participants, a detailed statistical analysis did not seem warranted. Instead, responses are presented in tabular form in the following section. Upon completing the second survey round, a written summary of answers was compiled.

Empirical Results

The results presented in this section are meant to provide a baseline consensus regarding the future of the Canadian grain marketing system. In the following tables, survey questions are presented with the participant responses and select comments. The complete survey, answers, and comments can be found in Appendix B. Questions will be provided in the order asked in the survey, followed by discussion and comments.

Table 8. Prairie Elevator Numbers in Five Years

How many primary elevators do you expect to be operating in the Prairie Provinces 5 years from now?	Preliminary Results	Secondary Results
< 250 elevators		
251-550 elevators		
551-950 elevators	7	9
951-1,300 elevators	2	1
> 1,301 elevators		
Total	9	10

The first questions deals with the number of primary elevators present in five years (Table 8). The majority of respondents chose the range of 551-950 elevators. After the second round, only one respondent did not agree to that range. If this reduction in primary elevators is seen over the next five years, slightly more than one in three elevators would be closed to reach the range average of 750 elevators.

Table 9. Prairie Elevator Numbers in 10 Years

How many primary elevators do you expect to be operating in the Prairie Provinces 10 years from now?	Preliminary Results	Secondary Results
< 250 elevators		
251-550 elevators	7	8
551-950 elevators	2	2
951-1,300 elevators		
> 1,301 elevators		
Total	9	10

When asked to further address their expectations regarding the Prairie elevators (Table 9), most participants anticipate 250-550 elevators within 10 years. Two respondents remained consistent in selecting the higher range of 551-950 elevators. These responses indicate expectations of continued decline in primary elevator delivery. The expected loss of delivery points has important implications for the road system, producer truck equipment requirements, and light density branchlines.

Table 10. Five Year Change in Production

If answering yes to question 4, in 5 years do you expect production to:	Preliminary Results (Per Year)	Secondary Results (Per Year)
Respondent 2	Increase 1%	Increase 1%
Respondent 4	Increase 10%	Increase 10%
Respondent 7	Increase long-term average	Increase long-term average
Respondent 8	Increase 2-3%	Increase 2-3%
Respondent 10	Increase 2%	Increase 2%

All respondents expect an increase in production (Table 10). A majority agreed with a yearly increase of 1-3 percent, attributed to expected advances in farm practices, technology, varieties, and yields. While increased grain production usually translates to increased elevator handling, respondents seven and ten noted, respectively:

> ..... *Increases in production will NOT result in increased elevator handling, because it can be expected that beef, pork, and poultry production on the Prairies will substantially increase and consume large volumes of feed wheat and barley. There will be substantially increased direct deliveries of grain, oilseeds, etc. to value-adding production. Overall, primary elevator receipts at Prairie grain elevators are likely to decrease over the next 10 years, despite continued increases in production.*
>
> ..... *I expect a lower portion of total Canadian production to be handled by Canadian elevators. Reasons include increased Prairie livestock feeding and increased deliveries to the United States.*

Thus, it is important to note that, as the Canadian system is rationalized, the opportunities for diversification and alternative marketing paths will be identified. The economic implications also will be tested against the current marketing processes.

Table 11. Factors Affecting Forecast Primary Elevator Numbers in Ten Years

Factors: *Respondent #:*	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Avg.**
Inter-firm Competition and Pressures for Improved Efficiency	2	1	3		1		1			1	1.6
Changes in Railroad Regulation, Pricing, and Competition	1	2	1	1	4	1	5	1	1	3	1.9
Primary Elevator Handling Decreases							2				2.0
Changes in Rail System Miles and Coverage	4	4	2	2	2	3	3		4	2	3.0
Changes in Grain Production	6	6		5			6		5		3.4
Changes in Canadian Wheat Board and Grain Marketing Policies	5	3	5	3		2	7	2	2		3.6
Changes in Grain Trucking Practices	3	5	4	4	3	4	4	3	3		3.7

Respondents were asked to rank factors that affected the previously forecast number of primary elevators (Table 11). The majority of responses pointed to elevator efficiencies and inter-firm competition as primary influences in the primary elevator system. Changes in the rail industry, including regulation, pricing, competition, and system structure also received attention from respondents. This type of factor ranked high on the list of many respondents. A comment by respondent eight focused on the possible relationships between specific factors:

> …. *You ask if "changes in rail system" is a factor affecting forecasted number of elevators. This seems to confuse cause and effect. Line reductions will flow from the same underlying causes as elevator reductions, and the effect (reduced lines and reduced elevators) can hardly be a cause. I also have some reservations about trucking practices, which I put as #3 in my list. Changes in trucking practices will be to a large extent driven by changes in handling and marketing; changes in trucking technology and regulation, on the other hand, could act as a causative factor for changes in handling and marketing. It is a complex interplay, which your question may not capture.*

Table 12. Amount of Grain Handled in 10 Years

Average amount of grain handled per elevator per year in 5 years?	Secondary Results
> 30,000 Tons per Year	
30,001-60,000 Tons per Year	3
60,001-90,000 Tons per Year	2
90,001-120,000 Tons per Year	2
> 120,001 Tons per Year	2
Total	9

Survey responses regarding storage capacities provide insight into expectations regarding capabilities of the individual prairie elevators (Table 12). In 1996, average handle for primary elevators in the Prairie Provinces was 26,000 tons (Canadian Grains Industry Statistical Handbook, 1996). These elevators are expected to increase annual throughput over the next 10 years. This increased throughput is consistent with expected increases in grain production and declining number of primary elevator sites. The distribution of this increased throughput is not likely to be shared equally among elevators, so positioning elevators with the ability to efficiently transfer grain from the country to the terminal market is an important aspect in the face of a more competitive Canadian grain marketing system.

Table 13. Factors Affecting Structure of the Canadian Wheat Board

Factors: *Respondent #:*	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Avg.**
Change in Management Structure	1	1	1	3	1	1	1	2	1	1	1.3
Loss of Government Guarantees			3								1.8
Spot Pricing Alternative							2				2.0
Loss of Barley Monopoly	2	2		2	2	2	4	1	2	2	2.1
Quarterly Pooling Alternative							3				3.0
Loss of All Monopoly Power	4	4		1		4	5	3	3	4	3.4
Privatization	3	3	2	4		3	6	4	4	3	3.6
Farm and Industry Lobby for More Accountability (Logistics/Pricing)			4								4.0

In the future structure of the Canadian grain marketing system, the role of the Canadian Wheat Board is key in assessing how flexible this nation's grain industry and transportation systems will be in responding to market forces. Thus, survey participants were asked to identify the relative importance of factors as they may impact the future structure of the Canadian Wheat Board. Potential changes in the management of the CWB and the loss of monopoly in the barley market were selected by a majority of the respondents as the most influential factors (Table 13). As management is attached to the philosophical base of the Board, and barley marketing to the grain marketing dominance of the CWB, it is logical that respondents viewed these factors as most likely to influence the future of the Board.

Table 14. Percentage of Barley Delivered to U.S. Elevators

If the barely market is liberalized, how much Canadian grown barley do you expect shipped directly to the United States?	Preliminary Results	Secondary Results
0-20%	7	9
21-40%	1	1
41-60%	1	
61-80%		
81-100%		
Total	9	10

Given recent initiatives in Canada to remove CWB control of the barley market, respondents were asked to estimate trends in the amount of barley shipped to the United States, given a liberalized barley market. As can be seen, most participants chose the lowest range of 0-20 percent shipped to the United States (Table 14). Based on comments made by respondents in earlier questions, these numbers may be attributed to several factors. One is the increase in Provincial livestock feed demand. Another is the belief that the grain marketing system housed by Canada will continue to deliver competitively priced export commodities to foreign markets beyond the United States.

Table 15. Percentage of Wheat Shipped to U.S. Elevators

If regulations were relaxed, and wheat was no longer under CWB control, what percentage of Canadian wheat would be delivered to U.S. elevators?	Preliminary Results	Secondary Results
0-20%	8	9
21-40%	1	1
41-60%		
61-80%		
81-100%		
Total	9	10

Because wheat is a dominant crop in the production venue of the Prairie Provinces, a question addressing wheat flows across the border was included in the survey. A majority of the survey respondents, however, expect that removing CWB control of wheat marketing would result in less than 20 percent of Canadian wheat being shipped to U.S. elevators (Table 15). A more mature elevator system in the United States may make production near the border vulnerable to economic forces that would draw it southward. These estimates, however, suggest that respondents expect Canadian grain elevator origination costs to be competitive, relative to those of their U.S. counterparts.

Table 16. Changes in Regulation or Operation of the Cooperatives

Will the regulations and/or operations change for the cooperatives, such as the Saskatchewan Wheat Pool?	Preliminary Results	Secondary Results
Yes	5	6
No	4	4
Total	9	10

Because cooperative play an important role in defining the infrastructure of the grain procurement system, the experts are asked if they believe regulations or operations of the cooperatives will likely change. A greater number respondents expected a change and provided some reasons, which include: change in car allocation, expansion of Saskatchewan Wheat Pool, down-sizing of elevator systems, and CWB management of grain company market share.

Changes in the marketing system and uncertainties regarding the infrastructure in Canada are tied to the future of the rail system. Therefore, the final questions in the survey were used to address the future of Class I operations and the potential for short-line development. A majority of the respondents predicted continued service for 10,000 to 12,000 miles of track (Table 17). By selecting 11,000 miles to be serviced in 10 years, the average for this range, this translates to abandonment/sales of over a third of the track currently operated by Class I carriers.

Table 17. Miles of Track Serviced in Prairie Provinces in Ten Years (All Classes)

What number of track miles will be serviced by all classes of railroads in the Prairie Provinces 10 years from now?	Secondary Results
< 8,000 Miles	1
8,001-10,000 Miles	2
10,001-12,000 Miles	6
12,001-14,000 Miles	
14,001-16,000 Miles	
> 16,001 Miles	
Total	9

In relation to the question about Class I abandonment/sale of track, experts were asked their view of the importance of short-line railroads as potential track operators in Canada. Based on responses, survey respondents expected short lines in Canada to account for up to 20 percent of the track miles operated in the Prairie Provinces (Table 18). These estimates suggest that respondents expect 0 to 30 percent of the track in the Prairie Provinces, that is currently operated by Class I carriers, to be abandoned, considering the overall Class I abandonment estimates made by the experts.

Table 18. Percentage of Track Miles Categorized as Short-Line in Five Years

What percentage of total Prairie track miles will be categorized as short-line miles in 10 years?	Preliminary Results	Secondary Results
0-20%	8	9
21-40%	2	1
41-60%		
61-80%		
81-100%		
Total	10	10

Although short-line numbers have been increasing in Canada, the rate has not been comparable to the United States experience. Canadian short lines are not as attractive as their U.S. counterparts "because of much lower traffic volumes and new exposure of lines to competitive line rates" (Heaver, 1988). Twelve factors (Wolfe, 1988) contributing to the failure of U.S. local and regional railroads include: limited traffic, economies of size and density, single factor reliance, traffic balance, high rehabilitation costs, loss of financial aid, competition, insurance, general economic conditions, loss of key management

personnel, inexperienced management, and (lack of) realistic business planning and (in)flexible financial instruments.

Another issue that will slow short-line growth in Canada is successor rights. Successor rights are provisions contained in federal and provincial labor statutes that require purchasers of rail companies to accept the existing labor contracts. These contracts generally include union wages for employees. These wages raise the operating cost for a purchaser of a short line. To operate profitably, short lines require crew members who perform multiple tasks. Under union contracts, workers have a limited number of job tasks. Saskatchewan currently is the only Prairie Province that has successor rights in place.

If the rationalization of rail miles continues, other issues must be addressed. The expected decline in railroad use will put pressure on alternative services such as trucking. With increased use of trucking comes a greater wear on roads. Each province is responsible for its own highway repairs, so additional methods of raising funds must be considered. With fewer shipping options, the cost of trucking also would be expected to rise due to reduced competition between the railroads and trucks.

Survey Summary and Comments

The Canadian survey was divided into specific areas. The first area concerned primary elevators. Respondents were nearly uniform in their answers to questions in this section. When asked how many elevators there would be five years from now, nine out of 10 respondents chose the range of 551-950 elevators. As one commented, consideration must be given to the type of elevator being counted: many high throughput terminals have been built or are going to be built in the Prairies. Only one respondent changed answers, from 951-1,300 to the majority answer. All respondents chose the next lowest range for the number of primary elevators in 10 years. All but one respondent chose the 251-550 range. That range

implies a minimum decrease of 390 elevators within five years and a maximum decline of 789 elevators. The overall decline more than 10 years would be between 790 and 1,089.

The new elevators being built by the Saskatchewan Wheat Pool have varying capacities. The larger terminals have 35,000 to 45,000 tonne capacities (1.38 to 1.77 million bushels)[6], while the smaller facilities have capacity of 25,000 to 35,000 (.98 to 1.77 million bushels) tonnes. ConAgra recently has built three large inland grain terminals, each handling in excess of 10 million bushels of grain per year. According to Clow and Wilson (1988), these multi-unit facilities would need to reach a total volume greater than 17 million bushels per year to minimize the average cost.

When comparing the expected amount of grain handled per year at primary elevators in the next five years, seven out of 10 respondents chose the range of 30,000 or more tons per year. Others chose the next lowest range of 24,001-30,000 tons per year. With respect to the amount of grain handled, five panelists expect an increase in aggregate production of 1-3 percent per year. Reasons listed were technology, higher yields, and improvements in farm practices. Although higher production is expected, two respondents commented that elevators may not handle higher volumes. Possible reasons include increased prairie livestock feeding, increased deliveries to the United States, increased shipments to value-added processors, and increased livestock production.

The next question dealt with factors affecting the number of elevators in the next five years. Options for these factors were listed, and space was given for written answers. All respondents expected a declining number of elevators in the future. Important factors included elevator obsolescence and consolidation, mentioned by five panelists. These factors are related to economies of scale (Oster, 1994), meaning an inverse relationship between unit cost and level of output. Other top factors include changes in the CWB's marketing policies and changes in railroad regulation, pricing, and competition.

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[6]Assume 56 pounds per bushel for conversion purposes.

Now the topic changes to the amount of grain handled per elevator per year. Since only the highest range (30,001 or more tons handled per year) was chosen, additional ranges were made available during the second round. The top three ranges were chosen by two respondents each, which shows their lack of agreement about future expectations. A third round may have led to greater consensus.

For questions concerning grain production, respondents' answers were similar for both time horizons. A 1-3 percent increase per year is anticipated because of yield increases, improvements in farming practices, and higher fertilizer use. The same factors were cited when respondents explained their forecasts of the number of elevators in the next 10 years.

The next section dealt with the CWB and possible changes in the marketing system. Asked to rank the factors that may affect the CWB, eight respondents identified "change in management structure" as most important. Possible loss of the barley monopoly was of secondary importance.

Recently, increases have been seen in the export of wheat and barley from Canada to the United States. When asked about continental barley flows under a liberalized market, nine experts thought less than 20 percent of Canadian grown barley would be exported to the United States. One expert commented that he anticipates a more thoroughly integrated North American barley market. A parallel question concerned continental wheat trade under a more liberal trade and marketing regime. With wheat no longer under CWB control, nine respondents thought that 0-20 percent of Canadian production would go to the United States. A comment from one respondent explained that he anticipated transhipment of Canadian grain through U.S. ports.

When asked whether the regulations or operations of cooperatives (e.g. Saskatchewan Wheat Pool) would be expected to change, six responded yes. Changes include public ownership, expansion of Saskatchewan Wheat Pool, and changes in car allocation. Also expect to see down-sizing of the system as a whole.

Railroads lines are affected by changes in legislation, elevator numbers, and new railroad opportunities. Currently, between the two Class I railroads, 15,731 miles of mainline and branchline track exists in the Prairie Provinces. When asked to estimate the number of miles serviced by all railroads in the Prairie Provinces in five years, five selected 12,001-14,000 miles. Others selected the 10,001-12,000 mile ranges. When asked about expected Prairie miles in the next 10 years, all respondents chose a lower range than their first answer. Since all responses for the percent of short lines expected in five years fell into the lowest category, a smaller range was provided in the second round. Seven responses fell within the 6-10 percent range. Within 10 years, all but one expert listed under 20 percent as the amount of line categorized as short-line. One comment stated that 25 percent of the Prairie line miles could be considered attractive short-line miles, but the railroad's negative attitude towards short lines would leave 15 percent available for the short-line option.

Limitations of Analysis and Scope for Improvement

The Delphi method requires various types of compromise. Although the Delphi technique can begin by asking respondents to identify important issues in the topic area, time constraints need to be taken into consideration. For purposes of this study, the issues were defined a priori, without input from respondents. Had the panelists been given the opportunity to present a list of relevant topics at the outset, the scope and structure of the analysis would have been different.

Time constraints also were seen in the number of survey iterations. Only two survey rounds were mailed out. The first survey listed possible ranges or answers, but allowed additional answers to be written in, and left space for any opinions or comments. The second survey contained answers and comments from the original for all respondents. Revisions also were made after the original survey. Clarification or rewording took place in questions and some ranges were broken up into smaller segments.

Given the time frame to complete this project, the survey process was limited in many areas. Another issue given consideration was the time horizon to publish this report. If too much time is spent between beginning and end of the entire process, the results can lose relevance. More in-depth analysis may be considered appropriate for specific topics, where this report has shown only general trends in the future.

CONCLUSION AND IMPLICATIONS FOR THE FUTURE

The grain procurement infrastructure and transportation system in the north central United States has experienced considerable rationalization over two decades. A major thrust in this streamlining has been deregulation of the rail industry. The deregulation that allowed differential pricing, rewards for procurement efficiencies, and flexibility in responding to market pressures has delivered a more efficient and relatively mature U.S. grain procurement system.

With global market pressures, internal demands for market efficiencies, and budgetary constraints, Canada has embarked on a mission to reform its grain transportation and marketing system into a system that is dynamic and responsive to economic market influences and customer demands. Viewing the Prairie Provincial situation in the context of the U.S. experiences is not realistic, as the CWB will continue to play a dominant role in the future composition of the Canadian procurement system. The review of the U.S. experiences does, however, provide insight into the value of elevator efficiencies and the potential role for short-line railroads in Canada's proposed transformation to a more competitive marketplace.

The results of the Delphi survey support the general sentiments that monumental changes in the Canadian grain marketing system and in the flow of grain south to U.S. processors is unlikely, at least in the foreseeable future. Expert participants in the survey did, indicate that they expect to see a more efficient grain procurement system characterized by high-throughput elevators, rationalized rail line operations, and expansion of short-line track miles.

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APPENDIX A

List of Survey Participants

Name	*Title*	*Organization*
Doug Campbell	Business Strategist-Agriculture, Trade, Transport, Politics	Campbell and Associates
Jack Candlish	Consultant	Retired-United Grain Growers
Richard Dawson	Agri-Business Consultant	Fulcrum and Associates
Paul Earl	Manitoba Policy Manager	Western Canadian Wheat Growers Association
Joan Hardy	Manager-Product Development	Canadian National
John Heads	Consultant	Former Director-University of Manitoba Transport Institute
Ralph Paragg	Manager-Transportation and Economic Branch	Saskatchewan Highways and Transport
Dan Stirling	Director-Grain	Canadian Pacific Railway
Shelley Thompson	Manager-Service Planning and Development Country Services Division	Saskatchewan Wheat Pool
Darrell Wallace	Manager-Transportation Services	United Grain Growers

APPENDIX B

The Prairie Provinces currently support 1,340 primary elevators. (As of August 1, 1995, Canadian Grains Industry Statistical Handbook 95)

1. How many primary elevators do you expect to be operating in the Canadian Prairie Provinces in 2001 (**5 years** from now)?

❑ FEWER THAN 250 ELEVATORS
❑ 251-550 ELEVATORS
❑ 551-950 ELEVATORS
❑ 951-1,300 ELEVATORS
❑ 1,301 OR MORE ELEVATORS

Respondent 1: 551-950 ELEVATORS
Respondent 2: 551-950 ELEVATORS
Respondent 3: 551-950 ELEVATORS
Respondent 4: 551-950 ELEVATORS

Comment: A 'primary' elevator in Canada usually means with a rail connection. I think it is very possible (and desirable) that many elevators remain open after losing their rail to abandonment, and they then become valuable truck satellites- this happened a lot in the USA/Iowa because of unit train discounts.

Respondent 5: 551-950 ELEVATORS
Respondent 6: 551-950 ELEVATORS
Respondent 7: 551-950 ELEVATORS
Respondent 8: 951-1,300 ELEVATORS

Comment: These ranges seem quite broad, and I suspect your extreme (less than 250 elevators) is unrealistic. Average throughput at 250 elevators is 120,000 tonnes. It is true that newly built elevators are designed to handle this range of volume, but do you really think it is at all realistic to expect a building program to provide 250 of such elevators in 5 years? If anyone does, he or she would have to be able to explain how such an ambitious program is to be accomplished either financially or physically.

Respondent 9: 551-950 ELEVATORS
Respondent 10: 551-950 ELEVATORS

Additional comments:

2. How many primary elevators do you expect to be operating in Canadian Prairie Provinces in 2006 (**10 years** from now)?

❑ FEWER THAN 250 ELEVATORS
❑ 251-550 ELEVATORS
❑ 551-950 ELEVATORS
❑ 951-1,300 ELEVATORS
❑ 1,301 OR MORE ELEVATORS

Respondent 1: 251-550 ELEVATORS
Respondent 2: 251-550 ELEVATORS
Respondent 3: 251-550 ELEVATORS
Respondent 4: 551-950 ELEVATORS
Respondent 5: 251-550 ELEVATORS
Respondent 6: 251-550 ELEVATORS
Respondent 7: 251-550 ELEVATORS
Respondent 8: 251-550 ELEVATORS

Comment: I answered 250 -550, but you have to consider how this number will be made up. At 250, well over 200 new large "inland terminals" would have to be built. At 550, 100 or so new terminals could operate with almost 400 older elevators handling about 40,000 tonnes each. 550 is doable; 250 is probably not. I think that more attention should have been paid to the rate of construction of new elevators, what would constitute slow, moderate, or high rates of construction for new facilities, how much they would handle, how much the remaining elevators would handle, and how many elevators the system would embody under each scenario. Then more meaningful ranges could have been chosen. Your ranges seem like nice round numbers, but they don't, I suspect, correspond to any underlying realities, and accordingly, I am not sure what the results of your survey will indicate.

Respondent 9: 551-950 ELEVATORS
Respondent 10: 251-550 ELEVATORS

Additional comments:

The average primary elevator presently handles 24,600 tons of grain per annum and turns over its capacity 5.0 times per year.

3. What would be the average amount of grain handled per elevator per year in 2001 (**5 years** from now)?

❑ FEWER THAN 12,000 TONS PER YEAR
❑ 12,001-18,000 TONS PER YEAR
❑ 18,001-24,000 TONS PER YEAR
❑ 24,001-30,000 TONS PER YEAR
❑ 30,001 OR MORE TONS PER YEAR

Respondent 1: 30,001 OR MORE TONS PER YEAR
Respondent 2: 30,001 OR MORE TONS PER YEAR
Respondent 3: 30,001 OR MORE TONS PER YEAR
Respondent 4: 24,001-30,000 TONS PER YEAR
Respondent 5: 24,001-30,000 TONS PER YEAR
Respondent 6: 30,001 OR MORE TONS PER YEAR
Respondent 7: 30,001 OR MORE TONS PER YEAR
Respondent 8: 30,001 OR MORE TONS PER YEAR
Respondent 9: 30,001 OR MORE TONS PER YEAR
Respondent 10: 30,001 OR MORE TONS PER YEAR

Additional comments:

4. In answering question 3, are you assuming a change in aggregate grain production?

_____ NO ➡ GO TO QUESTION 6, AND DO NOT ANSWER QUESTION 5.
_____ YES ➡ PLEASE ANSWER QUESTION 5.

Respondent 1: NO
Respondent 2: YES
Respondent 3: NO
Respondent 4: YES
Respondent 5: NO
Respondent 6: NO
Respondent 7: YES
Respondent 8: YES
Respondent 9: NO
Respondent 10: YES

5. If answering YES to question 4, in **5 years** do you expect production to:

❑ INCREASE BY _____% **per year**
or
❑ DECREASE BY _____% **per year**

Reasons for change in production:

Respondent 2: ❑ INCREASE BY __1__%
Technology

Respondent 4: ❑ INCREASE BY __10_%
Markedly higher yields in feed barley and in feed wheat, as we switch to seeds designed for those markets, rather than the milling wheat and malting barley that didn't make it.

Respondent 7: ❑ INCREASE BY __Long-term average__%
Improvement in varieties
Improvement in farm practices
Note: Increases in production will NOT result in increased elevator handling, because it can be expected that beef, pork, and poultry production on the Prairies will substantially increase and consume directly large volumes of feed wheat and barley. There will be substantially increased direct deliveries of grain, oilseeds, etc. to value-adding processors.
Overall, primary receipts at Prairie grain elevators are likely to decrease over the next 10 years, despite continued increases in production.

Respondent 8: ❑ INCREASE BY _2-3_%

Respondent 10: ❑ INCREASE BY __2_%
Making the normal assumptions of "typical years," not adversely or positively affected by weather and temporary market fluctuations, this is a normal rate of growth in five years. However, I expect a lower proportion of total Canadian production to be handled by Canadian elevators. Reasons — increased prairie livestock feeding, increased deliveries to the U.S.

Additional comments:

6. After answering question 1, please rank the most important factors affecting your forecast number of primary elevators in **2001**. (1 being the most important factor, the least important factor being the highest number)

_____ CHANGES IN GRAIN PRODUCTION
_____ CHANGES IN RAIL SYSTEM MILES AND COVERAGE
_____ CHANGES IN RAILROAD REGULATION, PRICING, AND COMPETITION
_____ CHANGES IN THE CANADIAN WHEAT BOARD AND GRAIN MARKETING POLICIES
_____ CHANGES IN GRAIN TRUCKING PRACTICES
_____ OTHER, PLEASE SPECIFY
_____ OTHER, PLEASE SPECIFY
_____ OTHER, PLEASE SPECIFY

FACTORS: RESPONDENT #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Changes in grain production	6	6		5			6		5	
Changes in rail system miles and coverage	3	4	2	4	2	1	3		4	2
Changes in railroad regulation, pricing, and competition	4	2	1	3	4	2	5	1	1	3
Changes in Canadian Wheat Board and grain marketing policies	5	3	5	1		3	7	2	2	
Changes in grain trucking practices	2	5	3	2	3	4	4	3	3	
Elevator companies reducing costs by increasing efficiency	1									
Elevator economic obsolescence and inter-company competition		1								
Non-viable volumes, elevator obsolescence, companies reducing costs			4							
Obsolescence at small/old plants										
Grain company cost-cutting										
Grain companies consolidating elevators					1					
Economies of elevator operation							1			
Overall primary elevator handling decreases							2			
Continuing economies of consolidation for elevator companies										1

Respondent 8: You ask if “changes in rail system” is a factor affecting forecasted number of elevators. This seems to confuse cause and effect. Line reductions will flow from the same underlying causes as elevator reductions, and the effect (reduced lines and reduced elevators) can hardly be a cause. I also have some reservations about trucking practices, which I put as #3 in my list. Changes in trucking practices, will be to a large extent, driven by changes in handling and marketing; changes in trucking technology and regulation, on the other hand, could act as a causative factor for changes in handling and marketing. It is a complex interplay, which your question may not capture. Comments also apply to question #10.

Additional comments:

7. What would be the average amount of grain handled per elevator per year in 2006 (**10 years** from now)?

❏ FEWER THAN 12,000 TONS PER YEAR
❏ 12,001-18,000 TONS PER YEAR
❏ 18,001-24,000 TONS PER YEAR
❏ 24,001-30,000 TONS PER YEAR
❏ 30,001 OR MORE TONS PER YEAR

Respondent 1: 30,001 OR MORE TONS PER YEAR
Respondent 2: 30,001 OR MORE TONS PER YEAR
Respondent 3: 30,001 OR MORE TONS PER YEAR
Respondent 4: 30,001 OR MORE TONS PER YEAR
Respondent 5: 30,001 OR MORE TONS PER YEAR
Respondent 6: 30,001 OR MORE TONS PER YEAR
Respondent 7: 30,001 OR MORE TONS PER YEAR
Respondent 8: 30,001 OR MORE TONS PER YEAR
Respondent 9: 30,001 OR MORE TONS PER YEAR
Respondent 10: 30,001 OR MORE TONS PER YEAR

Since each respondent choice only the highest range, please select from the following:

❏ FEWER THAN 30,000 TONS PER YEAR
❏ 30,001-60,000 TONS PER YEAR
❏ 60,001-90,000 TONS PER YEAR
❏ 90,001-120,000 TONS PER YEAR
❏ 120,001 OR MORE TONS PER YEAR

Respondent 1: 90,001-120,000 TONS PER YEAR
Respondent 2: 1200,001 OR MORE TONS PER YEAR
Respondent 3: 60,001-90,000 TONS PER YEAR
Respondent 4: 30,001-60,000 TONS PER YEAR
Respondent 5: 30,001-60,000 TONS PER YEAR
Respondent 6: 90,001-120,000 TONS PER YEAR
Respondent 7: 30,001-60,000 TONS PER YEAR
Overall average probably around 50,000. Made up as follows: 1) Between 100-150 very high capacity units directly handling an average of between 150,000 and 200,000 and, 2) with each of the above directly coordinating and supervising the operation of between 2 and 5 elevators each handling between the 20,000 T. and 50,000 T. range.
Respondent 8: 30,001 OR MORE TONS PER YEAR
Respondent 9: 120,001 OR MORE TONS PER YEAR
Respondent 10: 60,001-90,000 TONS PER YEAR
Respondent 9: Need higher range. We estimate 250,000 MT per elevator (high thru puts). Less on average.

Additional comments:

8. In answering question 7, are you assuming a change in aggregate grain production?

_____ NO ➡ GO TO QUESTION 10, AND DO NOT ANSWER QUESTION 9.
_____ YES ➡ PLEASE ANSWER QUESTION 9.

Respondent 1: NO
Respondent 2: NO
Respondent 3: NO
Respondent 4: YES
Respondent 5: NO
Respondent 6: NO
Respondent 7: YES
Respondent 8: YES
Respondent 9: NO
Respondent 10: YES

Additional comments:

9. If answering YES to question 8, in **10 years** do you expect production to:

❏ INCREASE BY _____% **per year**
or
❏ DECREASE BY _____% **per year**

Reasons for change in production:

Respondent 4: ❏ INCREASE BY __2.5_%
Yield increases in feed grains.
Yield increases in milling wheats.
Better moisture management on farms.
More fertilizer.

Respondent 7: ❏ INCREASE BY __Long-term average__%
Improvement in varieties.
Improvement in practices.
Note: Increases in production will NOT result in increased elevator handling, because it can be expected that beef, pork, and poultry production on the Prairies will substantially increase and consume directly large volumes of feed wheat and barley. There will be substantially increased direct deliveries of grain, oilseeds, etc. to value-adding processors.
Overall, primary receipts at Prairie grain elevators are likely to decrease over the next ten years, despite continued increases in production.

Respondent 8: ❏ INCREASE BY _2-3_%
2 -3 % growth is the range of growth in production for the last 60 years. Presumably there is some kind of limit, but I am not sure that we have reached it, and I am not sure that it would be possible to discern its arrival in 10 years of data. I suspect - and this is just a feeling in my bones- that it will take about 20 years to recognize when the trend flattens, and reaching the limit will be accompanied by much variation around the newly discovered limit. My only point is that this is not as simple a question as it looks.

Respondent 10: ❏ INCREASE BY __2_%

Making the normal assumptions of "typical years," not adversely or positively affected by weather and temporary market fluctuations, this is the normal rate of growth in 10 years. However, I expect a lower proportion of total Canadian production to be handled by Canadian elevators. Reasons — increased prairie livestock feeding, increased deliveries to the U.S.

10. After answering question 2, please rank the most important factors affecting your forecasted number of primary elevators in **2006**. (1 being the most important factor, while the highest number is the least important factor)

_____ CHANGES IN GRAIN PRODUCTION
_____ CHANGES IN RAIL SYSTEM MILES AND COVERAGE
_____ CHANGES IN RAILROAD REGULATION, PRICING, AND COMPETITION
_____ CHANGES IN THE CANADIAN WHEAT BOARD AND GRAIN MARKETING POLICIES
_____ CHANGES IN GRAIN TRUCKING PRACTICES
_____ OTHER, PLEASE SPECIFY _____
_____ OTHER, PLEASE SPECIFY _____
_____ OTHER, PLEASE SPECIFY _____

FACTORS: RESPONDENT #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Changes in grain production	6	6		5			6		5	
Changes in rail system miles and coverage	4	4	2	2	2	3	3		4	2
Changes in railroad regulation, pricing, and competition	1	2	1	1	4	1	5	1	1	3
Changes in Canadian Wheat Board and grain marketing policies	5	3	5	3		2	7	2	2	
Changes in grain trucking practices	3	5	4	4	3	4	4	3	3	
Elevator consolidation	2									
Economic obsolescence and competition		1								
Grain company decisions: cost-cutting, competition, consolidation, economies			3							
Grain companies consolidating elevators					1					
Economies of elevator operation							1			
Overall primary elevator handling decreases							2			
Canadian elevator companies wishing to consolidate										1

Respondent 10: You will note that six of us gave identical answers to questions 6 and 10. As a member of this majority, I think this is eminently sensible given our inability to see the future.

*** Note: The following question has been **reworded** for clarification. Please check your initial answers for correct interpretation.

11. Rank the following changes that you anticipate affecting the structure of the Canadian Wheat Board. (1 being the most **likely** factor, while the **least likely** factor is the highest number)

_____ LOSS OF BARLEY MONOPOLY
_____ LOSS OF ALL MONOPOLY POWER
_____ CHANGE IN MANAGEMENT STRUCTURE
_____ PRIVATIZATION
_____ OTHER, PLEASE SPECIFY _____
_____ OTHER, PLEASE SPECIFY _____
_____ OTHER, PLEASE SPECIFY _____

FACTORS: RESPONDENT #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Loss of barley monopoly	2	2		2	2	2	4	1	2	2
Loss of all monopoly power	4	4		1		4	5	3	3	4
Change in management structure	1	1	1	3	1	1	l	2	1	1
Privatization	3	3		4		3	6	4	4	3
Loss of government guarantees			3							
Farm and industry lobby for more accountability regarding transportation logistics and pricing			4							
Spot pricing alternative							2			
Quarterly pooling alternative							3			

Respondent 8: There again seems to be a mixing of cause and effect. Will a "change in management structure" affect the "structure of the CWB?" What is the difference between a change in management structure as a cause and a change in structure as an effect? How are your respondents to know what the difference is in your mind, and if they do not, does this impair the results of your survey? I am not sure how you can determine what you have measured or discovered when there is a kind of circularity between the question and the answer. Because I found your question unclear, I have ranked the four choices in order of the probability of their occurring.

Respondent 10: Generally I agree with #8, I agree that those (last three factors) are all likely, but they are perhaps best regarded as subsets of your four major possible factors.

12. If the barley market is liberalized, how much Canadian grown barley do you expect shipped directly to the U.S.?

❏ 0-20%
❏ 21-40%
❏ 41-60%
❏ 61-80%
❏ 81-100%

Respondent 1: 0-20%
Respondent 2: 0-20%
Respondent 3: 0-20% in short-term, 25% long-term
Respondent 4: 0-20%
Respondent 5: 0-20%
Respondent 6: 0-20%
Respondent 7: 0-20% Less than 1% (i.e. less than 125,000 tonnes). "Canadian grown barley" is taken to mean total of all barley grown in Western Canada, including what is fed directly, what is delivered to feed mills, what is delivered directly to malt plants, feed lots, etc. (i.e. 10-12 million tons approximately)
Respondent 8: 0-20%
Respondent 9: 0-20%
Respondent 10: 21-40% Obviously, I am the odd person out. I have compromised this time, but I must expect a more thoroughly integrated North American feed (and malting) barley market than my colleagues.

Additional comments:

13. If regulations were relaxed, and wheat was no longer under Canadian Wheat Board control, what percentage of Canadian wheat would be delivered to U.S. elevators?

❏ 0-20%
❏ 21-40%
❏ 41-60%
❏ 61-80%
❏ 81-100%

Respondent 1: 0-20%
Respondent 2: 0-20%
Respondent 3: 0-20% Maximum of 25%.
Respondent 4: 0-20%
Respondent 5: 0-20%
Respondent 6: 0-20%
Respondent 7: 0-20% Less than ½ of 1% (i.e. less than 150,000 tonnes).
Respondent 8: 0-20%

Respondent 9: 0-20%
Respondent 10: 21-40% Including onward export (overseas and to Mexico) of Canadian grain from the U.S. Note this inclusion, if only for U.S. consumption I would agree 0-20%, although I am also sympathetic to the comments of Respondent 3.

14. Will the regulations and/or operations change for the cooperatives, such as the Saskatchewan Wheat Pool?

_____ NO ➡ GO TO QUESTION 15.

_____ YES ➡ PLEASE ANSWER THE FOLLOWING QUESTION.

Please list the expected changes:

Respondent 1: YES
-car allocation change
-CWB management of grain company market share
Respondent 2: NO
Respondent 3: YES
Public ownership: demands economic/financial performance, including elimination of losing subsidiary plants. This is a direct clash with the long-standing cooperative philosophy preached by Pool dogma.
Expect down-sizing more rapid than at any time in Pool history, with trucking packages to ease pain and reduce the opposition from Pool patrons.
Expect aggressive posture regarding capital expansion, value-adding, and competition with other companies (including farmer co-ops, AWP, MPE, UGG).
Respondent 4: NO
Respondent 5: YES
SWP plans to expand into Manitoba and Alberta.
Respondent 6: YES
Expansion of SWP.
MPE and AWP's hostile takeover of UGG. If successful, operations will change.
Respondent 7: NO
Respondent 8: YES
Two of the largest coops (UGG and SWP) have gone public; they are no longer coops in any true sense of the word, because they are increasingly managed in the interests of the shareholder, not those of the customer. The allegation that these interests always coincide is rhetoric. The impacts of this remain to be seen. There were substantial reforms in both your country and mine in the 1920s and 1930s over precisely this issue.
Respondent 9: NO
Respondent 10: YES
Already happening- SWP and UGG are publicly traded companies; expect AWP to follow within five years and probably MPE. Also agree with comments of Respondent 8.

Additional comments:

Note: The following two questions are being asked with correct Prairie data and ranges.

Current miles of mainline and branchline track per Class I company in the Prairie Provinces:

Canadian Pacific	6,119 miles
Canadian National	9,612 miles
Total	15,731 miles

15. What number of track miles will be serviced by **ALL** classes of railroads in the Canadian Prairie Provinces **five years** from now (2001)?

❑ LESS THAN 8,000 MILES
❑ 8,001-10,000 MILES
❑ 10,001-12,000 MILES
❑ 12,001-14,000 MILES
❑ 14,001-16,000 MILES
❑ 16,001 OR MORE MILES

Respondent 1: 12,001-14,000 MILES
Respondent 2: 10,001-12,000 MILES
Respondent 3: 12,001-14,000 MILES
Respondent 4: 12,001-14,000 MILES
Respondent 5: 12,001-14,000 MILES
Respondent 6: 12,001-14,000 MILES
Respondent 7: 10,001-12,000 MILES
Respondent 8: No response.
Respondent 9: 10,001-12,000 MILES
Respondent 10: 12,001-14,000 MILES

16. What number of track miles will be serviced by ALL railroad classes in the Canadian Prairie Provinces **10 years** from now (2006)?

❑ LESS THAN 8,000 MILES
❑ 8,001-10,000 MILES
❑ 10,001-12,000 MILES
❑ 12,001-14,000 MILES
❑ 14,001-16,000 MILES
❑ 16,001 OR MORE MILES

Respondent 1: 10,001-12,000 MILES
Respondent 2: LESS THAN 8,000 MILES
Respondent 3: 10,001-12,000 MILES
Respondent 4: 10,001-12,000 MILES
Respondent 5: 10,001-12,000 MILES
Respondent 6: 10,001-12,000 MILES
Respondent 7: 8,001-10,000 MILES
Respondent 8: No response.
Respondent 9: 8,001-10,000 MILES
Respondent 10: 10,001-12,000 MILES

U.S. Short Line Railroad information:

	1979	*1995*
Number of short line railroads	35	530
Miles operated	2,204	45,361

Source: Profiles of U.S. Railroads--1994 Edition--Supplement
Association of American Railroads + Updates

17. What percentage of total Prairie track miles (answer to question 15) will be categorized as short line miles in **2001** (five years from now)?

❑ 0-20%
❑ 21-40%
❑ 41-60%
❑ 61-80%
❑ 81-100%

Respondent 1: 0-20%
Respondent 2: 0-20%
Respondent 3: 0-20%
Respondent 4: 0-20%
Respondent 5: 0-20%
Respondent 6: 0-20%
Respondent 7: 0-20%
Respondent 8: 0-20%
Respondent 9: 0-20%
Respondent 10: 0-20%

After utilizing only the lowest range, please choose one of the following that best represents your view:

❑ 0-5%
❑ 6-10%
❑ 11-15%
❑ 16-20%

Respondent 1: 6-10%
Respondent 2: 16-20%
Respondent 3: 6-10%
Because "grain only" on most lines, revenue stream is much riskier than in U.S. setting where greater commodity diversity (and greater volumes) exist.
Respondent 4: No response.
Respondent 5: 6-10%
I anticipate short-line railways will take over operations on a substantial portion of "abandoned" tracks. I do not see a drastic change in the pattern of the rail lines even with elevator closures.
Respondent 6: 6-10%
Respondent 7: 6-10%
Respondent 8: No response.
Respondent 9: 6-10%
Respondent 10: 6-10%
Since your November survey, Central Western has closed roughly 100 miles of track, but Hudson Bay Line has been made a short line. Personally, I am very negative on grain short lines, preferring abandonment of unviable and semi-viable track.

Additional comments:

18. What percentage of total Prairie track miles (Answer to question 16) will be categorized as short line miles in **2006** (10 years from now)?

❑ 0-20%
❑ 21-40%
❑ 41-60%
❑ 61-80%
❑ 81-100%

Respondent 1: 0-20%
Respondent 2: 21-40%
Respondent 3: 0-20% Consider 25% of Prairie miles as attractive short line miles; however, railroad attitude still negative toward short line option, so reality will be much less, say 15%.
Respondent 4: 0-20%
Respondent 5: 0-20%
Respondent 6: 0-20%
Respondent 7: 0-20%
Respondent 8: 0-20%
Respondent 9: 0-20%
Respondent 10: 0-20% Future of short lines more a political issue than an economic issue.