Electronic Rail Car Market Allocation System: A Conceptual Model for Increasing Competition in Western Canadian Grain Handling and Transportation

By
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A Thesis
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in Partial Fulfilment of the Requirements
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Abstract

Electronic-commerce (e-commerce) has private and public benefits. Lower search and transaction costs can be captured as private benefits within vertical structures called electronic hierarchies, or within electronic markets (Malone et al, 1987). Public goals of allocative and distributional efficiency can be assumed only in market-like relationships. The questions that follow are how can, and when should, the public intervene to encourage electronic markets, rather than electronic hierarchies, to develop?

Western Canadian grain transportation is a case where competition is preferred by farmers to vertical relationships between grain companies and a railway duopoly. The problem is to create an environment in which these highly concentrated industries will act as if they are in direct competition. In the economic deregulation of the airlines, governments failed to see that the key to competition was the control of airport gates and landing slots. In the case of grain transportation, the key point of competition is the rail car. Like shelf space in a supermarket, whoever controls the allocation of rail cars has a profound impact on the industry. This thesis explores the concept of an electronic market to allocate rail cars, as originally proposed by Prentice (1998), as a means of introducing competition in the grain transport industry.

The institutional structure of an electronic trading system has an important bearing on the distribution of the benefits. Public benefits from e-commerce can only be assumed if a

complete pre-condition institutional structure can be identified that includes classification and quality checking, membership rules, centralized transaction processing, standardized contracts and price generating institutions (Reimers, 1994). Electronic trading systems that are institutionally deficient are biased and may not serve the public interest (Prentice and Mulligan, 1996).

A case study of the administered rail car allocation system finds that electronic market processes exist with the exception of a missing membership structure. A not-for-profit corporation, here called the "Rail Car Authority", would complete the necessary Reimers pre-conditions. The Rail Car Authority would be responsible for sustaining a fleet of covered hopper cars for the transport of Western Canadian grain, and for ensuring equitable and efficient access by shippers to these rail cars.

Acknowledgements

I would like to acknowledge the cooperation received during the thesis work. In the early stages, individuals from diverse industries were interviewed on a research subject that was difficult to relate to. Nonetheless, every interview request from the regional director of the IATA to the Manitoba Securities Commission was accepted. When the research topic was focussed on rail cars, Don Kraft and Tom Cascisa patiently provided information about how the Western Canadian transportation system moves grain.

Next I would like to thank my employer, Investors Group. The firm supported me in a number of ways, again, notwithstanding the absence of an identifiable self-interest.

The endeavour to develop a methodology from a not well travelled branch of economic theory perhaps created a less than typical thesis experience. While I may understand the road I chose, others who support me in my everyday life were not given the option between the easy and the hard way; they only witnessed and had to deal with the latter. For this I would like to acknowledge the perseverance of my wife and family.

Finally, I would like to acknowledge my thesis advisor Dr. Barry Prentice from whom I learnt that in academic life there is always work in progress that competes for your personnel time. I would like to thank Barry for his personnel time spent on this thesis.

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Chapter 1

1.1 Introduction

The movement of grain by rail to Western Canadian export terminals has been a public matter since early settlement of the prairies. The Crows Nest Pass Agreement of 1897 and subsequent Statutory Freight Rates (1925 - 1983) represent the government's participation in the transportation of grain on behalf of the farming community.

The replacement of the Statutory Freight Rates with the Western Grain Transportation Act (1984 - 1995), and their subsequent termination, presents a dilemma for the government. Institutional structures that were established on the basis of subsidies that exceeded $720 million at their peak cannot remain unchanged when these subsidies are withdrawn. Consequently, the search has begun for a new and more efficient grain transportation system based on competition and accountability.

A series of public commissions and reports have examined and recommended changes to the relationship between railways and farmers. The most recent efforts are the Estey Review (1998) and Kroeger Process (1999) that proposed changes to the Canadian Wheat Board and Canada Transportation Acts.

The proposed changes can be interpreted as a shift in the public willingness to regulate the Canadian grain handling system. Kroeger (1999) points to the evolving government position:

> **"...for nearly two decades, governments have progressively moved away from regulations and central controls towards providing substantially greater scope for normal commercial decision-making...you (the government) endorsed Justice Estey's call for measures to move further towards a more commercial, contract-based**

system in which there would be more competition, clearer accountabilities, and greater scope for market forces to influence decision-making."[1]

Three key economic issues have been defined by previous policy actions: rate relationships, cost based pricing and rail car access. These issues were all addressed in Mr. Justice Estey's report to the Minister of Transportation. Mr. Arthur Kroeger was given a mandate to develop Mr. Justice Estey's broad vision into legislative actions. Kroeger's work with stakeholders yielded recommendations on cost based pricing for the railways with a Revenue Cap, and rate relationships with a Final Offer Arbitration process.

Replacement of the administered rail car allocation system was not included in Mr. Kroeger's terms of reference. Rail car access was left to a secondary examination along with other 'loose ends' such as the future of ports. Effectively, this decision also deferred the liquidation of the government owned rail car fleet. This delay may be opportune because it allows time to examine the options open to the government for sale of the rail cars. This thesis argues that the rail cars should be transferred to a not-for-profit public corporation (a "Rail Car Authority") that could maintain the car supply in good condition and offer unbiased access through an electronic market.

Electronic market trading creates the closest commercial example of the benefits attributed to the "perfect market". The identity of buyers and sellers, whether rich/poor, long term consumer/new market entrant, or large firm/small firm, does not influence allocation results (i.e. atomistic trading). An electronic market for allocating rail cars could create a set of rules for competition that would achieve many of the public goals that years of direct intervention through subsidies and regulations have failed to obtain.

The question then follows: What rules would combine to form the electronic rail car market? Reimers (1994) hypothesizes that electronic markets, in general, can be identified by a specific institutional structure. Case studies substantiate Reimers' contention that a pre-condition institutional structure insures the benefits of market trading, i.e. a competitive price and allocative efficiency.

An electronic market to allocate rail cars would require representation from each pre-condition institution classification. One can look for pre-condition institutions in the processes that govern the current allocation system. Institutions can also be borrowed from other industries, for example from the American rail transport industry, or customized to meet a specific need.

A Rail Car Authority is found to complete the theoretical Electronic Rail Car Market. A Rail Car Authority could provide a competitive market for rail car rationing despite industry concentration. The key responsibility of the Rail Car Authority would be to create grain rail transportation capacity by maintaining a fleet of rail cars that would be made available to shippers on the basis of short term leases.

1.2 Problem Statement

Public support of electronic markets must be predicated upon a well-defined public interest. As Schmid (1993) points out, electronic markets neither fall from heaven nor are they a product of the invisible hand. Electronic markets require the investment of capital and also the efforts of industry stakeholders to support conventions and disciplines necessary to govern trading. The benefits of developing electronic markets must therefore exceed the costs.

In general, industry participants determine the competitiveness of their industry through their actions. Stakeholders, in effect, vote for industry structure by their choice of commercial relationships within their supply chain. Different institutional combinations form either firm-like or market-like relationships between buyers and suppliers.

Industrial organization can have profound impacts on the individuals found in an industry, in terms of wealth and lifestyle. Economic deregulation of the Western Canadian grain industry is creating significant institutional change. Most participants in the supply chain are exposed to change by the Estey and the subsequent Kroeger recommendations. The most important issue that seems to have been overlooked, however, is the management and allocation of the grain car fleet.

E-commerce adds to the timeliness of discussions about rail car allocation. The problem is that the public interest in support of market-like structures vs. vertical e-commerce relationships can be difficult to identify. Not only are the public benefits difficult to quantify, but the mutual vision between stakeholders necessary for group investments in electronic commerce processes may be hard to achieve. Specifically, no standards exist on which to base a mutual vision. This thesis offers an institutional blueprint for an electronic market that would be applied to the allocation of the Western Canadian grain rail car fleet.

1.3 Objectives and Scope

The general objective of this thesis is to respond to the problem of a lack of mutual vision for allocating rail cars by defining an electronic market standard. The standard is established by a test of Reimers' (1994) hypothesis that the benefits of a fully functioning commercial electronic market approach those produced by theoretical market model.

Reimers' definition is substantiated using three case studies of industries that employ electronic information systems. The case studies investigate the Winnipeg Commodity Exchange, the International Airline Ticket Association and the Winnipeg Real Estate Board multiple listing service. The goal is to establish a relationship between the competitiveness of each industry and the degree to which Reimers' pre-condition institution structure can be identified.

The first specific objective is to define the public interest in rail car allocation. This is an important step that is necessary to justify public support for a market-like rail car allocation process. The public interest is established by a historical review of economic regulation of railway transportation.

The second specific objective is to define a conceptual electronic rail car market. This objective is met by applying Reimers' electronic market standard to the procedures/institutions currently in place to allocate rail cars. Reimers' standard anticipates that the required processes are already established in the Western Canadian grain industry and that missing institutions can be introduced to complete an electronic market institutional structure.

The theoretical objective of this paper is to describe the role of institutions in the coordination of economic activity. This is achieved by organizing work from the loose grouping of economic literature know as the School of Institutional Economics.

Chapter 2

2.0 Rail Car Allocation: Historical and Economic Background

Three fundamental issues have shaped public policy with respect to rail transportation in Canada. The first is the rate relationship between shippers supplying commodities to the same markets. Shippers want "fairness" in that similar circumstances should yield similar freight rates. The second issue is the relationship between shipping rates and railway costs. Seasonality leads to the third issue. Western Canadian grain transportation has the added complication of a peak shipping period of September to January that requires the rationing of a limited supply of rail cars.

The history and economics behind these three issues are investigated in this chapter. The investigation is followed by a description of the American approach to rail car rationing, the administered system rationing rail cars in Canada and also the direction of change found in the Estey Review (1988) and the Kroeger Report (1999).

2.1 History of Rail Transportation Policy

Government regulation of railway transportation dates back to the English Carriers Act of 1830. This early legislation established the legal and economic rights of carriers and shippers and, in turn, defined the commercial relationships governing rail transportation. Since that time, railway transportation has been the subject of public policy to control the behaviour of railways in all countries.

Railway behaviour is dominated by sunk costs. Depending on the time frame, sunk or fixed costs account for 25-50% of total costs. Approximate time frames for fixed costs are fifteen years for locomotives, twenty-five years for rail cars and forty-five years for

track.[2] The indivisibility of costs reduces flexibility in deploying capital and encourages railways to compete for traffic.

Fixed costs create an incentive for volume that encourages railways to form strategic relationships with shippers supplying large amounts of freight on high density traffic points and corridors. Such strategic relationships benefit both the shipper who receives a favourable freight rate and the carrier that reduces the risk of under-utilizing capacity. On the other hand, long term shipper-carrier contracts can exclude other shippers. Lande (1989) cites the behaviour of railways during the 19th Century in the United States as an early example of this effect.

> **"Rates were often made secretly or subject to change without notice. Discriminatory rates favoured one locality over another. Because the larger carriers could offer larger rebates, and because the larger shippers could offer more incentives to induce rebates, both the small carriers and the small shippers eventually suffered while business tended to become more concentrated."**[3]

Ironically, freight rate discounts had the consequence of initiating "destructive competition" between railways. The success in capturing traffic from another railway had the effect of increasing the competitor's average long term costs, given a downwards sloping cost function. This was a conclusion of the MacPherson Royal Commission that was addressed in the 1967 Canadian Railway Act.

The Canadian experience of railway bankruptcies, the National Continental and Intercolonial railways during World War I and the subsequent bankruptcy of the Canadian Northern and Grand Truck Pacific railways, had a profound influence on transportation policy. The legacy was the formation of a government crown corporation,

Canadian National (CN), to compete with the loan private enterprise, the Canadian Pacific Railway (CP). The direct participation of the Canadian government in the provision of railway transportation services reinforced its role as a regulator.

The concept of collective rate making was a practical policy response to destructive competition in Canada. Collective rate making is the waiving of anti-combine rules to allow carriers to set price relationships between diverse customers and shipping points. Section 279 of the 1967 Railway Act of Canada stated:

> **"Railway companies shall exchange such information with respect to costs as may be required under this Act and may agree upon and charge common rates under and in accordance with regulations or orders made by the Commission."**

Shippers, on the other hand, have been protected from railway behaviour by a set of regulations known as the common carrier concept that is

> **"...fundamentally predicated on the performance of certain specified carrier duties, i.e., the duty to serve, to pickup and deliver, to charge reasonable prices for service, and to avoid undue preference, prejudice, and discrimination with respect to individuals, goods, or location."[4]**

The 1967 Railway Act had three rules that combine to create the common carrier concept:

> **i. the railway must carry all freight offered by any shipper (Section 262),**
> **ii. the railway must follow published tariffs (Section 275),**
> **iii. no discounting or rebates from tariff rates (Section 380).[5]**

Collective rate making and common carrier obligations, in Canada, leveled the playing field between producers of primary products not only on different rail lines but also in different geographic locations. This effect can be seen between producers at different

locations.

> **"...let us consider the rate which CN Rail gives Noranda Mines on copper concentrates from Lynn Lake, Manitoba to Noranda, Quebec. There is an established relationship between this rate and the rates which CP Rail gives to Inco on the same commodity between Levack, Ontario and Sprecher, Ontario..."**[6]

The purpose of rate relationships can also be seen in a 1977 claim to the Canadian Transportation Commission that

> **"...presumed that a wood pulp shipper originating on CN would have the identical rate within the same zone as a shipper local to CP."**[7]

The nature of costs make railways receptive to rate relationships. The assignment of fixed railway costs to specific movements that not only have unique distances, but also specific backhaul factors, seasonal variations, and loading/unloading costs is an imprecise exercise.

In addition to rate relationships, shippers of rail freight want protection against monopolistic prices. Often no effective competition exists with respect to the transportation of export orientated grain in Canada. Modal competition with truck transportation ends beyond 500 to 800 miles in Canada. Likewise, studies have shown that American railway prices are not competitive with Canadian grain freight rates.[8]

Maximum rate ceilings were included as protection for "captive" shippers without competitive shipping options (Section 278 NTA 1967). Maximum rates are based on railway costs reported to federal and provincial regulators, i.e., cost based pricing.

2.2 Rationing: Problems With Economic Regulation

The excesses of economic railway regulations led to a public policy shift in the 1970s. The absence of price signals opens any industry to the short term problem of excess demand and the long term decline in plant. Mounting evidence of both effects in the rail industry resulted in economic deregulation in Canada and the United States. The implications of economic deregulation of the railways with respect to grain freight are discussed in this section.

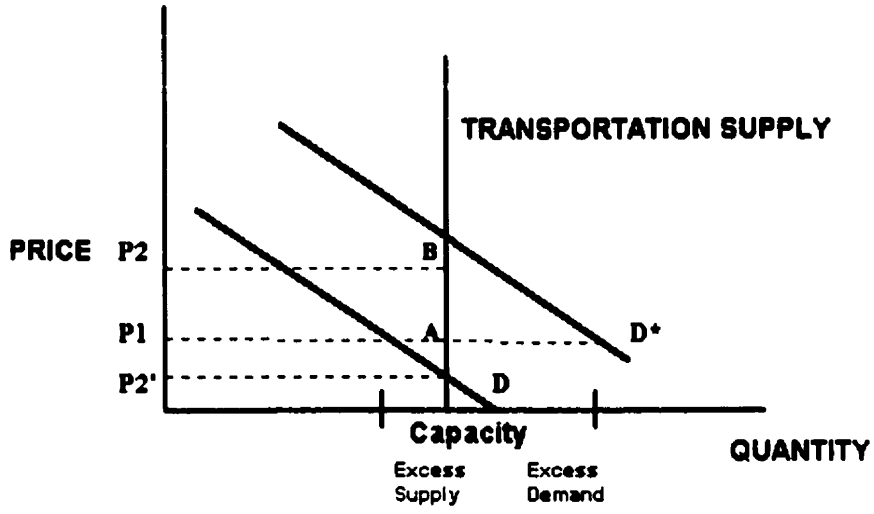
The main target of economic deregulation was the common carrier concept that has inherent problems when capacity is limited. Common carriers are regulated to serve customers on a 'first-order-first-serve' basis and are restricted from using price to ration services. The result is a system in which high value freight, low value freight and even 'phantom orders'[9] travel with the same priority. (The issue of phantom orders received direct attention in the Estey Review: Recommendation #13, that the CWB Act be amended to prohibit grain from moving into the logistics system in the absence of a sales contract).

Rail car rationing is inevitable in the export of Canadian grains because of the seasonal imbalance in freight traffic. Approximately sixty percent of shipments travel during the five month period from September to January. The result is a shipping peak with excess demand and an off season where equipment is under utilized.

A market based alternative to first-come-first-serve rationing is peak load pricing. As seen in figure one, the demand for grain transportation can be separated into peak and non-peak demand curves. The long term supply of rail service becomes perfectly inelastic as the system reaches capacity in the peak load model.

Figure 1

Peak Load Pricing Model



D* represents peak season shipping demand. At P2, capacity is rationed to shippers that value it highest and there is no excess demand. At P2', the market price in the off-peak falls below total costs to clear the market. Cost based pricing, in contrast, regulates price at long term costs, P1. In order to maintain this flat price, an administered system to ration rail cars is necessary in peak periods, i.e., excess demand. Excess supply is experienced during the off-peak season, D.

In the peak load pricing model, excess capacity is reduced during the non-peak period by equating price to variable costs. Ideally this price would be P2'. Shippers with low value freight can delay shipping until lower priced periods. All fixed costs are assigned to peak shippers for whom the system was designed to accommodate.[10]

Peak load pricing earns the railways a short term economic profit equal to the area

P1P2AB during the peak shipping season. Theoretically, economic profits attract long term investment capital. Rate regulation has the opposite effect. As seen in figure one, there is no signal to expand capacity at P1.

Disinvestments in Canadian and American railways during the 1970s was attributed to rate regulation that did not cover total costs. While the Canadian answer was direct investment in branch line rehabilitation and a government supplied hopper car fleet, U.S. economic deregulation under the Staggers Rail Act (1980) introduced economic deregulation.[11]

2.2.1 Certificate of Transportation

The Staggers Rail Act (1980) had specific reference to demand sensitive pricing:

> **"In order to encourage more efficient use of freight cars, notwithstanding any other provision of this subtitle, rail carriers shall be permitted to establish tariffs containing premium charges for special services or special levels of services not provided in any tariff otherwise applicable to the movement."[12]**

The Burlington Northern railroad (now the Burlington Northern Santa Fe railroad) was first to experiment with rationing rail cars to the highest bidder. The system that currently functions includes the initial auctioning and subsequent trading of Certificates of Transportation (COT) contracts to supply transportation services. The program has been summarized as follows:

> **"COTS - a forward capacity auction system which is used in 13 specific transportation corridors and encompasses 30-40% of BN's fleet. Cars are offered 3-6 months forward. Shippers submit sealed bids at a weekly auction, and results are published by BN. COTS are negotiable, and can be traded or sold to other BN users. BN guarantees service to successful bidders, with late charges of $50 per day."[13]**

Wilson and Dahl (1997) consider the economic implications of using priority pricing to ration nonstorable rail service. Priority pricing means serving customers who pay the most first and deferring service for customers that value it less. In the case of rationing non-storable electricity, for example, the cost of a hospital blackout is higher than the loss of residential air conditioning. In the grain industry, grain orders that face higher demurrage charges have priority.

Price efficiency in grain transportation, as identified by Wilson and Dahl (1997), is the extent to which price signals convey information about the value of rail car service. Price signals "induce shipper self-selection", allowing shippers to match different shipping strategies to available capacity.

> **"...now shippers have service options which allow them to formulate strategies to manage their risks associated with grain shipping. Since each shipper may adopt different strategies at different costs, it will be less common for shippers to have identical shipping rates."** [14]

Higher prices also encourage the supply of specific service characteristics.

Guaranteed service is a specific service characteristic analyzed by Wilson and Dahl (1997). In their forward contracting model, shipper bidding determines the value of rail car service guarantees. The sealed bid auction model was premised on the Burlington Northern COT program.

A forward car guarantee is a commercial contract that is valuable for two reasons.[15] First, forward car guarantees allow grain merchants to lock in margins on specific sales. Second, demurrage, interest and storage costs associated with the failure to secure rail car

capacity are lowered. Both values relate to risk reduction that varies under different market conditions. The shipper bidding profit function, Þ, describes this value:

Equation 1

Shipper Bidding Function

$$Þ i = Vi - bi$$

where Vi is expected value and bi is the shipper bid.

Railway sponsored trading of forward rail car contracts in the U.S. has its detractors. The Canadian Wheat Board cites shipper discontent with the COT program in its submission to the Estey Review. The Board isolates the problem of creating a priority class of service relative to the remaining tariff rate service and also questions the fairness of the bidding process.

> **"BNSF establishes a minimum bid on COTs at about the tariff rate. Bids go up from there, but not down...Bids are always above the tariff rate, to the railroad's revenue advantage, but never below which would be to the shippers' advantage. This is not a free market. (North Dakota Grain Dealers Association)."**[16]

A well articulated concern was expressed by stakeholders interviewed for this thesis. The concern is that price premiums would not signal Canadian railways to focus investment capital on the peak shipping period problem. Therefore, the net result would be a railway windfall without a corresponding increase in cars available during the shipping peak.

2.2.2 Administered Rationing

The ultimate Canadian response to the problems of railway disinvestments was the Western Grain Transportation Act (WGTA) of 1984. The WGTA followed previously mentioned attempts to address disinvestment (direct investment in branch lines and hopper cars) by subsidizing the gap between grain freight rates and railway costs.

Railways lost money on grain shipments during the 1970s. The gap between regulated tariffs and variable railway costs was measured at 38.9 percent in 1974.[17] The WGTA legislated a federal subsidy, paid to the railways, to bridge the gap between regulated rates and (eventually) total railway costs. The amount of the subsidy was significant, consistently representing over 50% of grain shipping costs, reaching a peak of $720 million in the 1991/92 crop year. Shippers contributed an amount equal to the historic Statutory Freight Rates (1925), indexed for inflation.

Railway grain related costs were reviewed every four years under the WGTA. Railways were entitled to economic profits resulting from cost reductions within the four year review at which time their freight rate 'bar' was lowered.

The quid pro quo of the WGTA subsidy was the shaping of the grain freight system to support the following federal government policy goals:

* All farmers should have equal access to grain markets and the transport system.
* All farmers should receive the same price for the same type and grade of export orientated grain.

The size of the WGTA subsidy attracted the attention of both domestic budget cutters and international free trade forces, resulting in its elimination in 1995. Farmers received a one-time payment of $1.6 billion in compensation for the loss of both the WGTA subsidy

and the historic Crow Rate benefit.

These changes did not, however, supersede existing rail transportation policy goals. Common carrier obligations remained and maximum rate scale legislation was implemented. This rate regulation was based on a modified policy goal:

* All farmers should pay equal per mile rail costs regardless of where they are located or the type of grain they ship.[18]

The result is the "administered system" that exists today described by the phrase "cooperative and collaborative" by its proponents and "exceedingly complex" by its detractors.[19] The current system rations cars based on allocation guidelines determined by committees and working plans. The Canada Transportation Act (CTA) also plays a role.

The CTA defines a special class of grain freight that is subject to rate regulation. This clause and the associated formula are commonly known as the Maximum Rate Scale. The per mile rate cap applies to all grain shipments for export to countries other than the United States, plus North American shipments through Thunder Bay.

Grain shipments subject to the Maximum Scale Rate system include both cars that are controlled by administered processes and also non-administered cars allocated by the railways. Both are subject to high level rationing by the Car Allocation Policy Group (CAPG).

CAPG performs many allocation functions, beginning with the allocation between administered and non-administered rail cars. CAPG also rations rail cars between the two traffic corridors (east through Vancouver and west through Thunder Bay); and

commodity groups such as the split between board and non-board grains.

CAPG guidelines flow from the Senior Executive Officers group that represents Western Canadian grain handling firms, the Canadian Wheat Board, railways and three producer groups. Membership is voluntary yet well supported. The CAPG constitution, for example, is signed by approximately thirty grain handling and transportation firms.

Three working plans govern CAPG decisions. They are the Capacity Working Plan, the Four Month Handling and Transportation Plan and the Canadian Wheat Board's eight week plan. These plans determine the transportation corridors that cars will be allocated to, and ultimately the grain companies that will receive allocations.

The Capacity Working Plan begins the process of forecasting supply and demand for the entire crop year. Demand is based on shipping the entire export grain crop. Supply of cars is forecasted using railway information about total grain car fleet and car cycle times, and industry information on estimated port capacity.

The Capacity Working Plan produces decision rules to be used throughout the year with respect to the split between board and non-board grains, and also priorities on traffic corridors. Each of these decision criteria plus supply estimates are reviewed on a semi-annual basis.

Semi-annual projections are supplemented by the Four Month Handling and Transportation Plans that is updated monthly. This plan receives information from shippers on all rate regulated grain sales and non-rate regulated shipping information from the railways. The Canadian Wheat Board (CWB) provides its sales information and also its required split between Canadian Pacific and Canadian National railroads,

necessary to draw from grain zones.

CAPG meets weekly to assess performance and make actual car allocation decisions. This is the last snapshot of system capacity including terminal unloading performance. It is the ten day time frame in which the railways begin to make capacity commitments. CN and CP meet with CAPG members on Thursday to determine the number of hopper cars that will be available for loading in the shipping week beginning ten days later.

Available grain cars include planned unloads in addition to empty cars in distribution yards. Empty cars are moved from export terminals to distribution yards through the Main Classification Yards of Winnipeg, Edmonton and Calgary. Ideally, Winnipeg cars serve the Thunder Bay - Churchill corridor while Edmonton and Calgary distribution yards service the Vancouver - Prince Rupert corridor.[20]

Allocation decisions fall from the Four Month Working Plan. The railways begin with allocations to non-rate regulated customers. These shippers receive allocations from the railways and reply with requested loading points information that is fed back into the CAPG allocation process.

The split between non-board and board allocations is made on each of the two rate-regulated corridors (east or west) based upon allocation guidelines from the Capacity Working Plan. The loading of board grains is directed by the Industry Rail Car Allocation Policy (IRCAP) rules based on historic traffic patterns and performance incentives. Allocation of non-board cars is made by the Non-Board Allocation Office based on sales commitment information included in monthly position statements from grain companies.

2.3 Government Hopper Cars

Post-WGTA policy includes provisions for the federal government to sell its rail car fleet.[21] Eighty percent of grain hopper cars are owned by the federal and provincial governments. The disposition of these cars would have an impact on the grain handling system. First, because rail cars that are now provided to the industry free of charge will have to be paid for by shippers. Second, ownership of rail cars if concentrated, has the potential to transfer market power to the new owners.

Travecon (1996) focuses on the market power that the owners of the rail cars could have. They estimate that railway ownership would add $12.6 billion to freight rates over a twenty year time period.[22] This cost is relative to a farmer owned rail car fleet.

The federal government has not expressed a preference on who will purchase the rail cars. The only condition is that the cars remain in service for Western Canadian grain. Estey has recommended that the right of first refusal to the railways be allowed to pass. However, he does not suggest a preferred alternative.

2.4 Kroeger/Estey

The Estey and Kroeger reports were the federal government's response to discontent with the post-WGTA administered rail car allocation process. Estey gathered information and developed a broad vision on which Kroeger was commissioned to create a practical process and, in turn, recommendations for legislative change. This chapter reviews the results.

2.4.1 Estey Review

Mr. Justice Willard Estey was appointed by the federal government to gather information and opinions on how to change the Canadian grain handling system. As with all political action, the Estey review was reaction to a critical mass of unhappiness with transporting grain by rail, focused on the loss of the WGTA and significant system failures.[a]

The report by Mr. Justice Estey was the most thorough consultation on this subject undertaken in recent years. The Estey review included "147 meetings with over 1000 stakeholders",[23] in addition to review of more than 250 written submissions. Estey's conclusions were submitted to the Minister of Transportation December 1988, and later accepted as policy goals to be advanced by the federal government (May 12, 1999).

Among Estey's fifteen recommendations, two have an impact on rail car allocation. The most significant being to have the CWB **"...remove itself from active participation in the handling and transporting of grain".** A second recommendation was that car allocation should be commercially driven and open to longer-term reservations.

2.4.2 Kroeger Process

The Minister of Transportation appointed Mr. Arthur Kroeger to produce a working plan from Estey's broad vision of change. The major obstacle in this task was to reconcile opinions of stakeholders whose negotiating positions reflected a history of economic

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[a] Kroeger Stakeholders' Report. "Concerns about the health of the system were exacerbated by problems in the winter of 1996-97 when logistics and severe weather conditions led to a significant failure of the system. The system problems caused producer losses estimated by the CWB at $65 million, and generated a complaint about railway performance to the CTA by the CWB. A previous major system failure occurred in crop year 1993-94."

conflict.

> **"...the historic divisions among Western stakeholders in the grain handling and transportation system proved too wide to be bridged. The problem of reaching consensus was exacerbated by a degree of fear and mistrust on the part of each stakeholder group vis-à-vis the others that exceeded anything I have encountered elsewhere in the private sector."**[24]

Although Kroeger failed to gain consensus, he fulfilled his mandate to provide concrete legislative actions to be in place for the 2000/01 crop year. Kroeger recommends that the CWB be effectively excluded from the rail car allocation process by limiting the CWB to buying grain at the ports prior to the beginning of a crop year. (Kroeger recommended that this process be fast tracked to 75% port purchasing after three years.) A second action will be to replace cost based pricing of rail service with a revenue cap. A third is to implement a final offer arbitration process to give shippers negotiating power vis-à-vis the railways. A fourth recommendation is that the railway industry will not be forced to "open access" to competition due to a lack of supporting evidence and risk to railway operations.

Kroeger's results can be analyzed against the historic criteria of rate regulation, cost based pricing and rail car access:

Rate relationships. The concept of rate relationships underlies the final offer arbitration (FOA) process. In the absence of government costing of railways, the only grounds for contesting a rate will be relative to other shippers with similar freight.

While the effect of FOA on rate relationships is yet to be proven, some obvious problems exist. First is that FOA is by nature backward looking. As a result, FOA will be hard

pressed to compensate unrealized business opportunities that result from transportation inequalities. In a best case scenario, a FOA process must be speedy and operate at minimal costs to the participants.

Cost based pricing. The Revenue Cap replaces cost based pricing. While regulators would cease to measure railway costs, the proposed revenue cap of $838 million is in fact based on a twelve percent reduction in 1998 regulated rates. The cap, and future reductions in the revenue cap, can be viewed as acknowledgment that measuring railway costs is difficult and may not be justified relative to the potential rewards. The revenue cap does not disassociate rates to costs but reduces the incentive to monitor railway costs.

The annual Revenue Cap is intended to give the railways flexibility to assign prices to specific movements. The intent is to allow railways to communicate cost information by frequent changes to tariff schedules. Shippers must accept that different freight loads, even loads within the same zone and on the same line type, have inherent cost differences. Primarily due to railway traffic volumes.

Rail Car Access. The Kroeger report anticipates that the Canadian Wheat Board will cease to allocate rail cars, effectively eliminating the IRCAP process. This leaves two functioning systems as possible allocating processes; both controlled by the railways. Neither guarantees open or competitive access to the Western Canadian grain transportation system.

The first functioning alternative is the non-administered rail car allocation system. Rules governing this process are not public information. Moreover, non-administered allocation is not considered by grain shippers to be a rigorous process but rather an arbitrary process.[25] It is not clear how such a system could operate when the interests of

private rail car owners replace the public interest inherent in the government ownership of rail cars. Presumably, private owners would want to have cars allocated in a manner that maximizes their economic return.

The second option is for railways to assume the non-board allocator car rationing procedures. The railways would make allocation decisions based on terminal elevator position statements and sales commitment information provided by shippers.

In both cases the question becomes market power and the provision of service. The size of the rail car fleet and order cycle times would be the domain of the railways. Private owners would never provide cars sufficient to meet peak demand because these cars would remain under-utilized the balance of the year. Total rail car capacity, fleet size multiplied by yearly cycles, will be set at the point where rail car owners maximize profits.

2.5 Summary

Legislative action to implement the Revenue Cap, and the elimination of the CWB from transportation, isolates rail car allocation as a subject requiring attention. The subject is underscored by the lack of effective competition for the supply of rail cars. Kroeger maintains that opening the railways to competition, i.e., providing running rights to new railways on CN and CP tracks, is not a viable option for the foreseeable future. Railway control of the allocation process increases the opportunity to exert market power and creates questions with respect to competitive access for shippers.

The idea that railways would effectively communicate cost information through rapid tariff changes, unit train discounts etc. is not supported by economic theory or history.

Canada's two Class One railways form a duopolistic industrial structure. To the extent that they exert market power, railways should not be expected to be overly concerned with cost reductions or in sharing system efficiencies with shippers. The behaviour of railways through history tells us that railways use freight rates to further other goals such as attracting large shippers and winning freight from other carriers.

Economic deregulation in the United States has left a mixed system of demand-based pricing and diminished common carrier obligations.[b] Railways allocate part of the grain fleet on a first-come-first-serve basis to honour common carrier obligations and the remainder to the highest bidder. Although premiums draw shipper discontent, the allocation process can be understood.

The results of Canadian deregulation could have the ironic consequence of replacing a complex administered process with something less understandable. For example, it would be difficult for a shipper to understand rate differences between freight from two different locations with similar distance, line type and volume, or freight that originates in the same location with different carriers. Both scenarios are likely.

The flip side of tariff differences is competitive access. Profit maximizing railways would not allocate rail cars where the tariff is the highest, but where the spread between the tariff and costs is greatest. The effectiveness of Final Offer Arbitration to adjudicate shipper complaints of unfair allocations is questionable. System costs that include

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[b] O'Brien (1986) points out that American common carrier responsibilities are significantly diminished "...differences between rates, rules, or practices which result from different services cannot be considered violations of the Act. The ban on unlawful rate discriminating, which had been a fertile source of litigation, was rendered largely a thing of the past."

backhaul factors, seasonal variations, and loading/unloading costs, will remain proprietary information owned by the railways.

The loss of administered control over railway costs has not been replaced by competitive forces to reveal railway costs or the criteria behind allocation decisions. The Canadian Wheat Board makes this point explicitly in their submission to the Estey Review:

> **"...once one railway sets the tariff rate, the other railway would have no incentive to undercut that rate. This price leadership approach would allow the railways to take advantage of their duopoly position in a fashion which would not be much different than if the two railways were formally colluding."**

The following section provides stakeholders a starting point for discussing rail car allocation alternatives. The theoretical alternatives are market-like and firm-like institutional structures. Railway controlled allocations are ultimately firm-like vertical relationships. Canadian Pacific described their preference to be **"...direct shipper/carrier negotiations, in which shippers interact one-to-one with their carrier of choice".**[26] The theoretical opposite is the coordination of economic activity in markets.

Chapter 3

3.0 Electronic Markets and Electronic Hierarchies

Rail car allocation is analyzed as a comparative institutional question in this chapter. Theoretically, commercial options can be classified as either market-like or firm-like. Electronic commerce has reduced transaction costs to the point where commercial examples approach the theoretical extremes of the market model and the perfectly integrated firm.

An electronic hierarchy is the coordination of economic activity through computers between a buyer and supplier in a firm-like relationship. Firm-like means that only one supply option is considered. Electronic hierarchies perform well in communicating supply and demand information. Vertical electronic relationships would be suitable for communicating detailed operational information on which the long term service packages could be negotiated and monitored.

On the opposite theoretical extreme, computers and the E-commerce can be used to increase the number of potential shipper-carrier combinations. This system would be an electronic market, trading rail car capacity to shippers that value it highest.

The distinction between market-like and firm-like behaviour is presented in this chapter to help stakeholders determine the economic implications of rail car allocation scenarios. The reader should recognize that railway controlled options are firm-like in nature. Transaction Cost theory does not distinguish between a fully integrated firm and legally separated companies in a single supplier relationship. Only markets produce the competition to lower costs and consider all potential economic matches. The analysis begins with the simplest economic decision, whether or not to expand search.

3.1 Search Costs

The dynamic behind competition is the willingness of buyers/sellers to search for better exchange alternatives. Economic exchange is the matching of resources from those that value it low, such as a specialist in the production of a good or service, to a consumer, who values it high. For every resource and consumption preference, a theoretically perfect lowest cost/highest value combination exists.

Search Cost Theory addresses the obvious question: Why then would an economic agent not search for a perfect match? The answer is that the "ascertainment of market price is costly."[27] When information about supply/demand alternatives is costly, economic agents rationally limit the search for better value and prices.

Stigler (1961) defines the "search" for best market prices:

> **"A buyer (or seller) who wishes to ascertain the most favourable price must canvass various sellers (or buyers)."[28]**

Stigler continues on to mathematically determine the effect of the number of buyer searches, **n**, on the minimum or best price, **pmin**. Assuming a uniform distribution between zero and one, the average minimum price is directly related to the number of searches, $1 / n+1$,and the variance of the minimum price distribution also declines as the search expands, $n / (n+1)^2 (n+2)$.

The behaviour of **pmin** is apparent in Stigler's example assuming sellers having either a price of $2 or $3, and a normal distribution. (Stigler qualifies his example by noting that "The frequency distributions of asking prices have not been studied sufficiently to support any hypothesis as to their nature".)

Table 1
Distribution of Hypothetical Minimum Prices By Numbers of Bids Canvassed

No. of Prices Canvassed	Price of $2.00	Price of $3.00	Expected Minimum Price
1.....	.5	.5	$2.50
2.....	.75	.25	2.25
3.....	.875	.125	2.125
4.....	.9375	.0625	2.0625
infinity.....	1.0	0	2.00

Clearly, the motivation to search for a lower price is the expected savings.

> **"the expected savings from a unit of search (n) will be approximately the quantity (q) he wishes to purchase times the expected reduction in price as a result of the search, or q x Pmin / n ."**

The search ends when the expected marginal benefits of additional search equals the marginal costs of expanding the search. This decision is personal because each economic agent assigns different values and expectations about the costs and benefits of search.

The cost of search increases when the identity of buyers and sellers is unknown. The inability to segregate potential buyers/sellers in the population being searched multiplies search costs by the inverse of the fraction of potential buyers/sellers to the population. A potential buyer/seller must not only be interested in a transaction, but a potential buyer/seller during the relevant search time period.

Stigler's message is that the decision to search for a lower cost supplier is dependent upon both the expected benefits and expected costs of finding a better match. Knowing this, suppliers charge a premium over costs equal to the expected net results of searching for the next supplier. The Rate Cap, first proposed by CP Rail, can be interpreted as an acceptance that further investigation of railway costs is not justified by the cost of search.

A weakness in search theory is that a search that stops at one supplier may be poorly defined as a market transaction. In the following section, a search of one is defined as the opposite of a market transaction called a firm.

3.2 Transaction Costs

The School of Institutional Economics anlayzes how individuals coordinate economic activity using a different set of assumptions than those used by Stigler. As apposed to Stigler's implicit assumption that all exchange transactions take place in markets, Coasse (1937) defines a search limited to one supplier as a "firm" scenario. Coasses' work is based upon the observation that market transactions are different in nature than a similar transaction within a firm, and therefore have different transaction costs. It follows that search costs can be redefined as the change in transaction costs when market processes are used to find alternative suppliers.

Coasse observed a shifting equilibrium between firm-like and market-like institutional structures, based on the cost effectiveness of firms and markets in different industries.

> **"At the margin, the costs of organizing within the firm will be equal...to costs involved in leaving the transaction to be organized by the price mechanism."**[29]

Although this quote considers total costs, Coasse focused on the impact of transaction costs on the institutional mix used to organize economic activity.

Transaction cost economics defines a continuum beginning with a single supplier firm scenario and ending with a market institutional structure. Commercial relationships can

be placed along the continuum.

The choice of institutional structure is determined by transaction costs. Coasse defined transaction costs to include brokerage, contractual, risk and government costs. Williamson (1985) added Herbert Simon's Bounded Rationality Axiom to elaborate on contractual costs, and defined switching costs as the fifth transaction cost.[30] Economic agents incur transaction costs as they expand their limited information set about exchange opportunities.

Bounded rationality describes an economic agent with limited information about supply alternatives. Information is limited for a number of reasons. First, it is costly to gather. Second, owners of the information use it opportunistically. Finally, valuable information about the future does not yet exist.

Transaction costs are, in effect, the costs of freeing the flow of information. The following are the five types of transaction costs defined by Transaction Cost Theory:

i. Brokerage Costs. Coasse observed certain transactions in which the cost of putting buyer and seller together was minimal, such as buying a T-shirt at the mall. On the other hand, transactions with high brokerage costs **"involve parties who do not know where to find each other, and who have different ideas of what prices to charge or pay".**[31]

ii. Contractual Costs. All transactions are governed by laws and conventions determining what **"the mutual obligations of the seller and purchaser are.**[32] The costs of developing the contractual conditions vary from the relatively small cost of a bad experience when purchasing a T-shirt to significant costs when an infinite number of 'what-if' contingencies must be considered. Contingencies are an attempt to reduce the

costs of imperfect information about the future. Williamson reported that, **"both buyer and seller have to bear these risks."**[33]

iii. Risk Costs. Risk costs are distinct from brokerage and contractual costs. Sellers are not certain the next customer would not have paid more and buyers fear they could have found a 'better deal'.

iv. Government Costs. Coasse considers the effect of multiple points of taxation along the product channel that could be eliminated by an integrated firm. Government costs include the trade related costs of licensing and regulation.

iv. Switching Costs. Williamson observed that markets with many buyers and sellers are often converted into a small numbers situation if "steady or frequent" transactions are involved. Williamson termed this phenomenon the "fundamental transformation." The result is specific 'sunk' costs associated with synchronized or customized production plans.

3.3 Coordination vs. Production Tasks

The choice of governance structure, firm or market, is a function of the relationship between coordination and production costs found in specific industries. Coordination activities include the responsibility for design, price, quantity, delivery schedule and choice of supplier. Malone and Smith (1986) connect coordination activities to transaction costs and draw conclusions.

Coordination tasks stand in contrast to production tasks. Production tasks,

"...include the physical or other primary processes necessary to create and distribute the goods or services being produced."[34]

Malone, Yates and Benjamin (1987) point out that the distinction is difficult to make in practice, but it is intuitive. Consider rail car transportation. Despite constant communication between shipper and carrier, coordination tasks are separated from the shipper at the point where the customer order becomes a confirmed dispatched order.

Malone and Smith (1986) classify total costs as the sum of production and coordination. Coordination costs are reduced by internalizing decision making within firms and likewise by strategic alliances with single suppliers. Production costs, on the other hand, are lower when market forces are utilized (table 2). In the Classical economic model least cost (technically efficient) firms drive out obsolete firms, thereby lowering production costs. This dynamic is absent in a single supplier vertical relationship.

Table 2

Institutional Performance With Respect to Production and Coordination Costs

	Markets	Hierarchies
Production costs	LOW	HIGH
Coordination costs	HIGH	LOW

Lower coordination/transaction costs are related to the nature of the associated tasks.

"The choice of institutional arrangement creates two alternatives for achieving coordination tasks. In markets, this involves selecting suppliers, negotiating contracts, paying bills, and so forth. In hierarchies, this involves managerial decision making, accounting, planning, and control processes."[35]

The relationship between buyers and sellers on one hand, and members of a firm on the other, is different. Commons (1930) made the distinction between the one-sided commands of managers to reveal information and comply with orders in firms, and the balanced negotiating power of individuals in markets. Coasse, however, was less convinced that this fact alone improved the flow of information within firms. Consider for example the issue of fraud. Coasse contends that

> **"...inspection costs may be much the same for a firm buying from an integrated firm as they would be for a firm buying from an independent producer."**

3.4 Information System Technology

Transaction cost theory can be used to analyze the impact of information system technologies. Firms characterized by the use of computers are electronic hierarchies. Electronic markets are simply the use of computers to complete market transactions. This section defines the information system technologies utilized in electronic transactions.

The term electronic commerce, or e-commerce, describes the integration of information system technologies within both markets and firms. According to the EDI council of Canada, electronic commerce is the whole electronic assembly line that includes Electronic Data Interchange, Fax, E-Mail, EBS, VAN, Smart Card, Bar Code and Artificial Intelligence.

Electronic mailboxes are a low order information technology that does not screen information or those who have access to it. Electronic Data Interchange (EDI), in contrast,

> **"...is the computer to computer application transmission of data using a common standard, communications and translation."**

EDI protocols ensure that information is entered correctly and that it is sent to the appropriate party. EDI information can be coordinated through value added networks (VAN). A VAN

> **"...provides not only the message transfer capability, but also a number of services to assist the trading partners in managing their data including translation software, network interconnection, and trading partner profiling..."**

From a systems viewpoint, an electronic market is characterized by the use of e-commerce technologies to create inter-organizational communication systems. The technology is no different than systems used for intra-organization communication within electronic hierarchies.

3.5 Electronic Communication, Integration and Brokerage Effects

The implementation of e-commerce technologies has three economic characteristics: electronic communication, integration and brokerage effects.[36] These characteristics are found in both electronic hierarchies and markets.

"Electronic communication" is simply the use of information system technologies to increase the speed and reduce the cost of communicating product and service information. Lower communication costs allow for long distance "electronic integration". To achieve electronic integration, buyers and suppliers must run the same order processing software

in a format suitable for electronic transmission (at least EDI) or integrate a VAN into the order process. Malone et al (1987) describe the typical evolution of electronic relationships from "stand alone" to "linked" and finally "shared" databases.

The "electronic brokerage effect" is the computer assisted sorting of supply opportunities. Electronic brokerage technologies have the following impacts:

> **"i. increase the number of alternatives that can be considered,**
> **ii. increase the quality of the alterative eventually selected,**
> **iii. decrease the cost of the entire product selection process."**[37]

An electronic hierarchy uses the electronic brokerage effect to match its production to a broad customer base. In electronic markets, electronic brokerage technologies match multiple buyers and suppliers.

3.6 Impact of Information System Technological Change

Malone, et al (1987) hypothesized that the impact of technological change would shift the institutional equilibrium toward increased use of electronic markets. The impact on specific industries is the focus of this section from which the overall impact on the economy can be assessed. The relative magnitude of coordination costs determines whether electronic technologies are likely to be integrated into electronic markets or electronic hierarchies.

Their hypothesis is based on the observation that information system technological change will disproportionately reduce coordination costs that are primarily the cost of "processing and communicating information". The decline, relative to production costs

(equation 2), will shift institutional organization towards markets that are information intensive, ceteris paribus.

Equation 2

Relative Coordination Costs Equation

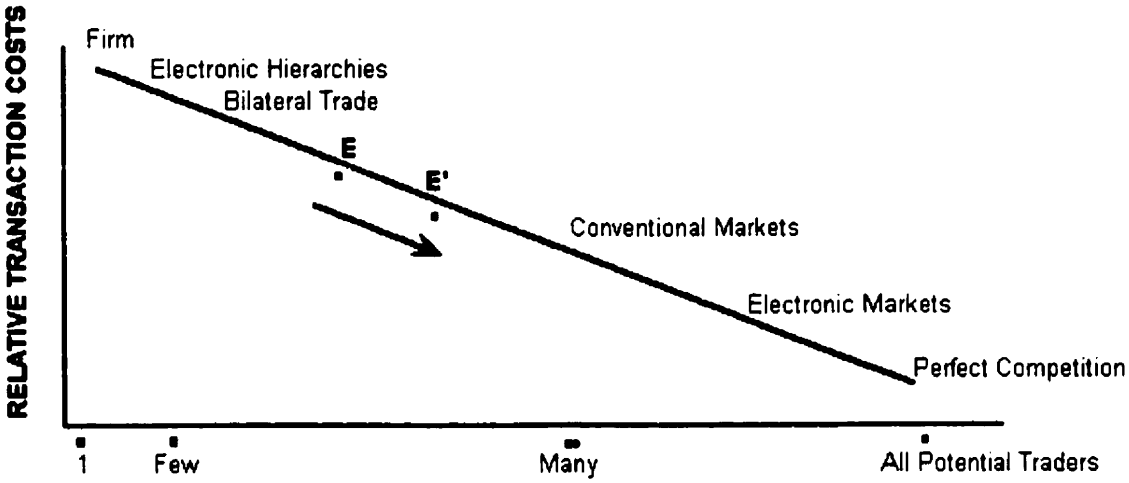
(-)coordination costs / (-)coordination costs + (no change)production costs

The nature of cost reduction is changes to coordination tasks. Electronic commerce modifies traditional coordination tasks. Initial entry of primary coordination information into a standardized electronic format eliminates record-keeping tasks, and allows both inter (market) and intra (firm) information systems to more efficiently match resources.

This hypothesis can be applied to cross-sectional analysis of industry institutional structures. Industries with relatively high coordination costs will tend to integrate new information system technologies within electronic hierarchies. Those industries with pronounced reductions in coordination costs will shift towards market processes (figure 2).

Figure 2

Industry Specific Relative Transaction Costs



Movement down the curve represents the reduction in relative transactions costs across all industries due to computer technologies. Point E shifts right to point E', as the equilibrium mix moves towards market-like economic coordination, and industries on the margin adopt market institutions.

From the perspective of the grain shipper, figure two suggests that an electronic rail car market should be investigated. Malone et al (1987) forecast that transaction cost forces press all industries towards open rather than closed economic relationships.

3.7 Planning Information

The Estey Review rules out a role for a public centralized information system (recommendation #2). With respect to rail car allocation, the key information is available rail cars and confirmed grain freight orders. This information is within the domain of the

proprietary information systems of railways and grain companies.

Transportation industries use proprietary information systems to expand the logistical time horizon by including future freight and future capacity. Once in an electronic form, this information can be communicated, integrated into a centralized system and sorted by electronic brokerage technologies.

How the benefits of improved matching of grain freight loads and rail cars would be shared is an important question. Theoretically, benefits would be shared between individual shippers and the railways, or available to participants in an electronic market that matched grain freight and rail cars. Whoever owns matching information will benefit from e-commerce.

An electronic rail car market would constitute a public centralized information system. An electronic grain freight market would give public access to available rail car information and historical market information.

3.8 Summary

Information system technologies reduce transaction costs. Since transaction costs are a deadweight cost, electronic commerce has direct social gains (Bakos, 1987). An equally important social gain is the improved matching of resources. Theoretically, the incentive to search describes this effect (Stigler, 1961). The effect is also demonstrated by the institutional equilibrium shift towards markets (Malone et al, 1987).

Exactly who will benefit from e-commerce within a specific industry can not be presumed. With respect to the grain rail transport industry, if the rail car allocation

process is conducted on the grounds of direct negotiations between individual shippers and the railways, the benefits will flow according to market power and circumstance, i.e. buyer's market or seller's market.

The classical meaning of the term "atomistic" describes the potential flow of benefits from an electronic rail car market. Atomistic means that either railway, and any grain shipper - large, small, with one time or recurrent freight - could share in the benefits of efficiently matching rail cars to freight.

Thus far, an electronic rail car market has yet to be offered as a rail car rationing option. The first step in such an effort is to improve the definition of an electronic market. The weakness of this chapter was that it defined an electronic market simply by what it is not - an electronic hierarchy.

The definition of an electronic market is more clearly addressed in the following chapter using Reimers' blueprint for constructing a complete electronic market. Reimers theorizes that an electronic market can be defined not by technology but by the presence of five institutional component parts.

Mulligan and Prentice's (1996) investigation of Reimers' pre-condition institutions is also included in the following chapter. The function of each class of institution is presented in addition to some general conclusions about electronic markets. The most interesting conclusion being that pre-condition institutions develop independently of markets. It follows that many of the institutional components of a Canadian electronic grain rail car market are likely to pre-exist.

Chapter 4

Chapter 4.0 Electronic Market Pre-Condition Institutional Structure

Reimers (1994) connects electronic commerce to economic theory by asking the question: what are the institutional component parts of an electronic market?[38] His work can be used to analyze whether or not an electronic trading system will produce the benefits of market trading. His theory offers grain industry stakeholders a standard on which discussions can take place, with the presumption of a competitive allocation process.

Reimers' (1994) work is the same vein as Hodgson (1988) who contends that Neo-Classical economics avoids the subject of "what is" a market. Hodgson redefines market exchange from an institutional perspective.

> **"We shall here define the market as a set of social institutions in which a large number of commodity exchanges of a specific type regularly take place, and to some extent are facilitated and structured by those institutions. Exchange, as defined above, involves contractual agreement and the exchange of property rights, and the market consists in part of mechanisms to structure, organize, and legitimate these activities. Markets, in short, are organized and institutionalized exchange. Stress is placed on those market institutions which help to both regulate and establish a consensus over prices and, more generally, to communicate information regarding products, prices, quantities, potential buyers and potential sellers."[39]**

Reimers takes Hodgson's definition further to hypothesize that not only do markets have a certain structure, but that social and economic institutions critical to organizing economic activity in electronic markets can be identified.

The following proposal falls from Reimers' definition of electronic market trading:

> ***The perfect competition benefits of atomistic trading, competition and allocative efficiency can be assumed if the following five pre-condition institutions are present: classification and quality checking, standardized contracts, membership rules, a centralized transaction process, and a price generating mechanism.***

This chapter begins with a basic description of social and economic institutions. Reimers' definition of an electronic market requires substantial representation from each of five specific types of institutions. Examples of pre-condition institutions are found in three case studies of electronic trading systems. The case studies attempt to substantiate the relationship hypothesised by Reimers between competition and the extent to which pre-condition institutions are found.

4.1 Social Institutions and The School of Institutional Economics

This section considers the broadest class of institutions called social institutions.[c] Social institutions specify and sanction social behaviour. Social institutions do not assure regular social behaviour but delineate the fundamental binary choice humans face. Individuals must choose between institutional acts or asocial acts with the consequences of punitive sanctions.

A social institution is defined by Schotter (1981) as:

> **"a regularity in social behaviour that is agreed to by all members of society, (and) specifies behaviour in specific recurrent situations..."**

Agreement infers a collective willingness to enforce, or sanction. Institutional behaviour is sanctioned in several ways.

Every institution derives its tenacity from one of three sanctioning forces, as defined by the associated social science discipline. These types of sanctions and the associated discipline are: ***collective opinion*** studied by ethicists; ***profit and loss*** studied by economists; and enforcement of institutions with ***violence***, as found in the study of jurisprudence.[40]

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[c] Commons (1930) encourages the search for a universal circumstance, common to all behavior known as institutional: "Sometimes an institution seems to mean a framework of laws or natural rights within which individuals act like inmates. Sometimes it seems to mean the behavior of the inmates themselves...Sometimes anything that is "dynamic" instead of "static" or a "process" instead of commodities, or activity instead of feelings, or mass action instead of individual action, or management instead of equilibrium, or control instead of laissez faire, seems to be institutional economics."

Social institutions are continually assessed for effectiveness. This assessment, found in Neale's definition of an institution, is the dynamic behind institutional change.

> **"1. there are a number of people doing,**
> **2. there are rules giving the activities repetition, stability, predictable order,**
> **3. there are folk views...explaining or justifying the activities and the rules."**

Neale's "folk view" causes institutional change. From a systems viewpoint, institutions are a decision rule and folk views are a control loop. Individuals gather information about their choices, take an action given an institutional restriction and the group collectively witnesses the result. An increasingly unhappy folk view of the results, feeds back as pressure to change, replace or eliminate the institution.[d]

Commons (1930) emphasizes the discretionary influence individuals have on institutions, making the distinction between **"unorganized custom and organized going concerns"**.

Unorganized custom is the oft-cited example by proponents of the non-discretionary or organic evolution of institutions.[e] Going concerns such as legislation, on the other hand,

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[d] As Posner (1976) summarizes "The efficient rules (institutions) will survive; the inefficient will be progressively ignored and eventually forgotten.

[e] Louis Schneider (1963) highlights the non-discretionary side of institutions: "broad societal institutions of these are not planned." A general blueprint of the institutions is not aboriginally in anyone's mind...

are unquestionably sponsored by individuals. Individuals use their resources, knowledge and communication skills to wilfully impact the institutional structure of society.

The role of individuals in developing institutions was identified in Walras's theoretical investigation of market exchange. Institutions result from the underlying perceptions, ambitions and emotions of individuals.

> **"...it is necessary and sufficient that this phenomenon (the formation of institutions) ...originate(s) in the human will and, besides, consists of a relationship between persons, designed for the mutual coordination of the destinies of the persons concerned."**[41]

Identifying the institutions that structure modern life is not an easy task. Individuals seldom name, or are aware of, the institutions that control a significant degree of economic/social life. Brown (1992) provides examples of the multitude of institutions that control daily life:

> **"orders - firms, non-profit groups, trade unions, corporate alliances, vertically integrated firms, conglomerates, franchises;**
>
> **principles and laws - contracts, patents, licensing, copyrights, moral strictures governing mutual obligations;**
>
> **usages - informal understandings, punishments, extra-legal rewards and punishments, patterns of leadership."**[42]

4.2 Case Studies

The case studies are an exercise in identifying economic institutions and also to substantiate Reimers' hypothesis that institutional structure determines the competitiveness of electronic trading systems. The case studies investigated the

Winnipeg Commodity Exchange (WCE), the International Airline Ticket Association (IATA) ant the Winnipeg Real Estate Board multiple listing service (MLS). The results are presented by sorting the institutions found into Reimers' pre-condition institution classifications.

4.2.1 Membership Rules

Membership rules proved to encompass many roles in support of electronic trading. The roles included trust of trading partners, financing of electronic systems, centralizing trading and opening trading to the public. Members, in the case studies, had to meet entry capital requirements, make regular financial reports with respect to capital, and carry insurance. The effect is to separate traders into those within and those outside the trading system.

Trader solvency. Membership qualifications and rules are used to limit trading to solvent traders. Trust of trading partners, in the case studies, was based on the ability to meet financial obligations resulting from trade.

The first method of ensuring financial payment is to control the ability to create liabilities. In real estate, there is no transfer of property rights until all money is held in trust by the vendor's lawyer. Travel agencies can create liabilities equal to two weeks of ticket sales. Commodity futures contract traders must fulfil risk adjusted financial liabilities daily.

The financial risks of trading are further reduced by institutions used in the case of default. Specific default conventions counter the risk created by the behaviour of a specific member and also compliment monitoring. The WCE is designed for low monitoring costs and high monitoring levels to counter the high risk of default. The IATA balances the risk of allowing travel agencies to developed biweekly accounts payable against the cost of monitoring four thousand Canadian travel agents and thousands more throughout the world. As a result, the IATA emphasizes travel agency compliance with the Billing Settlement Plan as opposed to monitoring.

The MLS case study revealed a specific example of institutional progress. The Manitoba Securities Commission requires brokers to carry a surety bond to cover purchaser deposits held in trust. Members of the Manitoba Real Estate Association created a defaultation of trust fund to replace the surety bond. Members can choose between payments to this fund and bank bonding charges. Institutional change lowers transaction costs.

At any time, there are degrees of solvency based upon the institutions that create the expectation of solvency (table 3).

Table 3

Examples of Solvency Institutions

Winnipeg Real Estate Board	International Airlines Ticket Association	Winnipeg Commodity Exchange
*surety bond/defaultation of trust fund	*claim against capital *loss of franchise	Examples of different solvency processes.

Finance electronic trading systems. The incentive for vendors to enter a listing agreement with real estate brokers is access to the MLS. The MLS is funded by brokers on a non-profit basis by an initiation fee ($2000.00), annual membership fees ($400.00), service user fees and a ($300.00) per transaction commission to the system. MLS members push for innovative computer technologies to attract to vendors. The same push for systems improvement exists but is less obvious in the WCE. Competitive computer reservation systems, on the other hand, compete on price, customized service packages and technology.

Opens trading to the public. Members can transfer their solvency into a guarantee of public traders. The IATA allows passengers around the world to book airline tickets based upon the credit worthiness of individual travel agents. Any shortfall between

biweekly ticketing numbers and payments from passenger clients is the responsibility of the travel agency. Similarily, the WCE controls public access by simply allowing futures commissions merchants to pass on margin requirements to the public trader responsible for the position. In contrast, real estate agents are not financially responsible for vendors or purchasers.

Centralizes trading. Buyers and sellers are drawn into a market when trading is exclusive to members. Airlines are coerced into the IATA and computer reservation systems because it permits travel agencies around the world to "ticket" airline seats. This draw for airlines subsequently brings in passengers who want to compare available seats. Real estate vendors, likewise, access as many potential purchasers as possible when entering their home onto the MLS. Seventy-five percent of all Winnipeg real estate sales are listed on the MLS.

The benefits of a centralized trading system are evident in futures contract trading. WCE futures contracts are easy to buy and sell and have narrow bid/ask ranges, i.e. liquid. These qualities attract trading volumes that yield the user fees to support WCE administration, control and monitoring processes, and information system technologies. In general, there is a positive relationship between trading volume and the efficiency of an electronic market.

4.2.2 Price Generating Institutions

Price generating institutions are found at the point in the negotiating phase where buyers and sellers have to make legal commitments to exchange property. Legal contracts are used to set levels of commitment. For example, the WRB multiple listing agreement commits the vendor to pay a broker commission but does not commit the vendor to an offer price. A real estate offer to purchase, on the other hand, forces a purchaser to reveal a bidding position.

A distinction can be made between price generating institutions used when traders agree on price and negotiate quantity, and institutions used in markets that change rapidly. The former describes both the real estate market where prices change slowly over time and in the market for airline tickets where passengers choose from a wide array of ticket options with different rules. In contrast, electronic communication of rapid changes in bid and ask information to dispersed traders is vital to the WCE.

Real estate purchasers consider a list of suitable real estate from the population of all available real estate. They bid according to the average market price for more or less than the average amount of real estate. The real estate market is therefore cleared in the short run by purchasers buying more or less real estate. Reimers considered similar situations and concludes that if the primary function of trading systems is the matching of buyers and sellers (electronic brokerage effect) the result is a competitive market.

> **"Only if contracts are concluded bilaterally does a matching procedure make sense. If installed, however, a centralized matching**

procedure comes near to a true price-generating mechanism, since it offers one form of central market clearing."

The lack of price negotiation characterizes the airline ticket market. Passengers simply commit to one of their options by contracting bilaterally with one airline. Although there is little price variation between airlines for similar tickets there is a multitude of ticket-condition combinations to consider.

4.2.3 Classification and Quality Checking

The three case studies revealed that market trading does not require a single dimension homogeneous product but instead an understanding between traders of what the product or service being traded is. Classifications allow traders to summarize the description and quantity of a good or service. Classifications can be communicated electronically if there is governance of classification rules and procedures. Governance gives traders an expectation that the good or service communicated electronically will match the contractual product description.

The case studies revealed different degrees of quality checking. In the case of real estate, there is no connection between the success of communicating classified real estate attributes and the guarantee of those attributes. The multiple listing agreement is completed by the best effort of the vendor and the listing agent. The MLS publishes the information with no guarantee of its veracity.

In contrast, grain delivered through the WCE is graded and measured against contract specifications. A specification is a combination of a classification and a standard. Delivered grain has to meet standards within a classification range. The price of the grain is adjusted to compensate for excess quality, or to discount for quality deficiency relative to the classification standard.

Historically, the WCE pushed the federal government for quality specifications.[f] The purpose, at that time, was to attract international demand. The idea was to reduce risk to international buyers who would respond by paying higher prices. The role of the federal government as an unbiased grader has evolved since the 1800s. Independent grading by the Canadian Grains Commission allows the grain industry to offset futures contracts with and grain commitments at many delivery points.

4.2.4 Standardization of Contracts

A standardized contract introduces a set of commonly understood contractual conditions into negotiations. Contractual conditions affected both the cost of production and value to consumers in the case studies. They also reduce the deadweight legal costs of a priori

[f] Levine (1987): The WCE teamed up with the Canadian Pacific Railway in 1885 to convince the federal government to "adopt an efficient grading and inspection system which included devising the top grades, No. 1 and No. 2 Manitoba Hard and, for lower levels, Nos. 1,2, and 3 Northern." It was also important to establish Winnipeg as an inspection point.

contract enforcement. A standardized contract sets the terms for establishing a contractual failure. Explicit terms are used to settle trading disputes without resorting to contract or commercial law.

The airlines are aggressive in setting contractual conditions. Passengers enter a contract with airlines, a copy of which is attached to each IATA authorized ticket. Claims for personal injury and baggage loss are limited. The ticket also exempts the airline from the responsibility to keep to a schedule. Contract conditions are set by individual airlines based on minimum contract conditions agreed to by members of the IATA.

Real Estate transactions are based upon a standardized multiple listing agreement and an offer to purchase. The Offer to Purchase is prescribed by The Provincial Real Estate Brokers Act. The Winnipeg Real Estate Board sets the conditions for the multiple listing agreement.

The WCE uses the Grain and Feed Trade Association (GAFTA) standardized cash contract that is neutral to buyers and sellers when grain is delivered. The GAFTA contract explicitly lists insurance, freight payment conditions and delivery point. These conditions are reflected in WCE futures contract price.

The GAFTA contract has many provisions for settling contract obligations before resorting to the legal system. The first provision is that WCCC clearing members jointly

fill in the delivered description and price. If the delivered grain does not meet futures contracts specifications, the clearing members can negotiate a price premium or discount.

Once signed, the GAFTA contract specifies dispute settlement mechanisms. The GAFTA cash contract default article 26 uses a process for settling defaults similar to equity financial markets. The party seeking recourse can satisfy the contractual commitment, which means buy or sell in the grain market, at market prices and claim the resulting difference from the defaulter. The defaulter can use the Arbitration article 30 to contest the claim.

4.2.5 Centralized Transaction Processing

The case studies uncovered three distinct institutional structures for centralized transaction processing. The function in each case was the same. To acknowledge the exchange of property rights and to release funds to the seller.

Real estate brokers use a network of lawyers to exchange property rights. This expensive transaction processing system, five hundred to one thousand dollars, is necessary because real estate property rights are deeply embedded in law and because the value of property rights is high.

Airline tickets are created by travel agencies that guarantee payment for IATA tickets. The ticket acknowledges the right of the passenger to an airline seat and also payment.

Airlines fulfil all IATA ticket obligations even though payment may not have yet been submitted in biweekly electronic fund transfers from travel agency bank accounts. Travel agent payments are distributed to members through the IATA.

WCE members must use the Winnipeg Commodity Clearing Corporation (WCCC) to settle financial obligations. The WCCC records all trades and authorizes the appropriate debit/credit to clearing member bank accounts.

4.3 Highlights

Price efficiency. The case studies suggest that a price efficient market opens trade to as many buyers and sellers as possible. This is achieved by the communication of market information that is a public good. Price information, for example, is important market information that can be utilized by an individual without detracting from another's use of it. Information about the trading behaviour of individuals is also a public good that can significantly reduce negotiating costs between infrequent traders. The presumption that all market traders wear halos significantly reduces information costs.

The IATA, the WRB and the WCE all employ electronic information systems to communicate market information and monitor traders. Advances in information system technologies change reduce system user fees and improve the flow of information. The effect is to draw in more potential buyers and sellers and further centralize trading.

Free riders are a threat to electronic trading. Free riders not only escape user fees but also are allowed to conceal market information. Off exchange traders avoid the risk of having to commit to a bid or offer and simply wait for market clearing prices. For example, a buyer could entice a seller outside the trading system with a price slightly higher than the last traded price.

Grossman (1989) considered the risk of committing to a position in a market.[43] It is the risk of the market hitting a firm bid/offer even though the true market-clearing price was lower/higher. Floor traders at the WCE reduce this risk by concealing their inventory of bids and offers in an effort to receive a competitive price for clients. This risk increases in automated electronic markets. A firm bid or offer made on the wrong side of the market price is communicated instantaneously and executed automatically.

The incentive to conceal true bid and offer positions is exemplified by trading through the MLS. Real estate vendors traditionally set offer prices far above what they are willing to accept. Travel agents can also misrepresent a commitment when reserving a seat ticket. Ideally, a passenger could reserve multiple seats in advance and pay for the best one as the departure date approaches. Airlines reduce these opportunities by setting a limit by which time the seat must be ticketed, called the ticketing date. Further, the IATA monitors reservation information to identify irregular behaviour by travel agents.

Complexity of product description. Although the success of the WCE can be attributed to simplified negotiations on price and quantity, the case studies suggest that complexity

of product description is not an obstacle to electronic trading. An airline ticket description is more complex than a futures commodity contract but is successfully transferred electronically. A house description is even more complex yet it is also transferred electronically. The criteria for electronic transmission turns out not to be the complexity but the ability to describe a product or service using attribute classifications.

Commodity futures exchanges are proficient in classifying tradeable contracts. The WCE sorts grain by type, grade and quantity. The traded contract is not identical to the commodity underlying it, but the relationship to it is thoroughly understood by traders.

Airline tickets also have classified descriptions, but do not achieve the same understanding between airline ticket buyers and sellers. The effort made by airlines to price and define ticket rules is disproportionate to the buyers' effort to understand the rules. The question is, do travellers sufficiently understand different ticket options? This is a condition for a competitive matching of resources.

Airlines are certainly aware of the costs of the different rule combinations attached to each ticket, and price them accordingly. When airlines successfully attach conditions that will be misinterpreted by passengers the price generating mechanism is not competitive. When airlines are compensated for adding value to the ticket then the pricing generating mechanism is working. Ticket buyers use travel agents in response to their information deficiency. Travel agents interpret ticket differences for passengers.

Brokers. Brokers were found in each of the case studies. Brokers initiated market processes to reduce deadweight negotiating costs, they interpreted market information, earned a brokerage fee for entering bids and offers into electronic markets, enforced standardized contracts and were vital to transaction processing institutions. In general, brokers allow the public to trade in electronic markets.

With respect to the benefits of brokers, inexperienced traders would be excluded from operating any of the information systems found in the three case studies. Of all three case studies, travel agents work with ticket information classified in the most arcane form. Travel agents not only decipher arcane computer reservation codes, but also relate the value of specific tickets with different combinations of prices, rules, and schedules to passengers.

There are three legal relationships between brokers and clients. The first is an "arms length" relationship that has the least protection for public traders. Brokers can consider their own interests, in this trading, ahead of the public trader. A used car dealer typifies this relationship in that the broker only has to avoid misrepresentation of facts. A second legal relationship is a "regulated" relationship. An example of this is the taxi cab driver. The taxi operator is directed by law to start the meter at the origin and charge a regulated rate. The extent of obligations, however, is limited by the letter of the law. This does not exclude taking a circuitous route to the taxi operators benefit. A "fiduciary" relationship excludes this behaviour. A lawyer has a fiduciary responsibility to advise a client

according to the best interests of the client without regard to the course of action that generates the highest legal fees.[44]

A fiduciary relationship offers the most benefits to public traders and was referred to by many of the interviewed in the case studies. However, the WCE case was the only one to achieve a rigorous fiduciary relationship between a broker and the public. WCE committees have the flexibility to interpret by-laws subjectively and fit the recourse to any breach of fiduciary responsibilities. The Manitoba Securities Commission usually defers to the effectiveness of the WCE.

The Manitoba Securities Commission also regulates real estate agents and brokers in an attempt to enforce a fiduciary relationship between agents and clients. This effort contrasts the efforts of the WRB to restrict broker liabilities in the real estate transaction.

Allocative efficiency. Allocative efficiency can be defined as the transfer of resources to individuals that value them highest. The case studies show that a price efficient market not only clears on price but also by traders choosing quantity. The electronic trading systems sorted buyers and sellers into groups with similar products/services and preferences allowing them to communicate.

4.4 Summary

Reimers' pre-condition criteria can be used to rank the case studies in terms of competition. In this regard, the Winnipeg Commodity Exchange scores highest followed by the International Airline Ticketing Association and the Winnipeg Real Estate Board multiple listing service. The effect of institutional deficiencies was to effectively reduce the number of potential buyer-supplier alternatives and by definition competition.

The main flaw of the IATA is membership rules. The IATA does not represent buyers of airline seats in contrast to the WCE that represents buyers and sellers equally. The lack of passenger input into airline conditions translated into ticket contracts biased in favour of airlines. The main institutional deficiency of the WRB multiple listing service was a lack of quality checking. Again, this stood in stark contrast to the WCE.

In both deficient cases, the identity of buyers and sellers was important. Airlines may be more or less inclined to confuse passengers with ticket conditions or more or less committed to keeping to schedules. Vendors may be more or less forthright with information about their real estate. The result is that buyers rationally choose to limit their choices as the cost of overcoming this information deficit rise. In practical terms buyers may restrict their choice or airline, or settle for a poorly selected search of real estate. The result in either case is a non-competitive outcome.

The main function of institutions is to control the behaviour of other economic agents. The behaviour of economic agents can be assumed to be atomistic in fully functioning

markets. Markets require buyers to pay for and sellers to deliver products and services without exception.

Information and competition are therefore closely related. Market and legal institutions combine to control trading behaviour and reduce the complexity of transactions, expanding the common ground on which to compete.

Electronic markets require significant institutional restrictions on behaviour because individuals are separated by distance. The ability to communicate over great distances with trading partners who may have no transaction history requires control of idiosyncratic trading behaviour. In general, increasingly open trading requires increased institutional control.

Chapter 5

5.0 Electronic Rail Car Market Model

Chapter five builds on the conclusion of the previous chapter that competition is dependent upon a pre-condition set of electronic market institutions. Reimers' institutional standard is used as a blueprint to construct a conceptual Western Canadian electronic rail car market from institutions currently in place.

The conceptual model must consider both existing rail car allocation institutions and circumstances specific to the Western Canadian grain rail transport. Two obstacles to an electronic rail car market, described in chapter two, are the reluctance of shippers to pay premiums and the inability to introduce competition between the railways. One opportunity revealed in chapter two is for farmers to assume responsibility for the ownership and access to the government's hopper car fleet.

In addition to existing institutions, and those borrowed from rail car bidding processes found in the United States, a Not-for-Profit agency called the Rail Car Authority would address the remaining issues. The Rail Car Authority would channel short term profits back into the grain handling system and also act as an outlet for the government's rail cars. This institution, and the remaining pre-condition institutions are described in this chapter.

5.1 Membership Rules

The controlling body of the Electronic Rail Car Market (ERCM) would be named the Rail Car Authority (RCA). The RCA would be a non-profit organization with a board of directors representing all stakeholders in the Western Canadian grain industry. This board would resemble the Senior Executive Officers institution. Western Canadian grain handling firms, the Canadian Wheat Board, the railways and producer groups would all be invited to participate.

The functions of the RCA would be to maintain the rail car fleet and govern the exchange. Membership rules would be used to qualify shippers. Shippers would have to pass capital solvency criteria and comply with the obligations of the exchange contracts. The primary obligations would be to fulfill financial commitments and not to interfere with the fair trading of rail car contracts.

The second function of the RCA would be to negotiate the following service contracts:

1. General contracts with the railways to supply diesel power, rail car storage and service guarantees.
3. Service contracts with railways to provide monitoring.
4. Service contract with a trading system intermediary to provide brokerage technologies and other trading support.
5. Hopper car maintenance contracts.
6. Hopper car lease and ownership contracts.

The RCA would embody competition policy goals of government. The RCA would become trustee of the government rail car fleet[8] rendering the cars to the exclusive use of the Western Canadian grain industry.

The railways would not be required to allocate their hopper cars through the RCA, but this might be an option they could choose. Essentially, the railways could use their cars to provide special services, or offer cars in competition with the RCA.

5.2 Classification and Quality Checking

A guaranteed forward and spot rail car service contract would be defined and monitored using institutions similar to the BNSF Certificate of Transportation (COT). Each Canadian Rail Car Certificate (CRCC) would be specified by a group similar in scope to the Car Allocation Policy Group, named CAPGII.

The COT specifies the obligation to deliver rail car capacity to a specific transportation corridor. BNSF offers forward contracts to deliver rail cars within two weeks of a strike date. Similarly, the car certificate would specify a spotting week and transportation corridor.

To be clear, the CAPGII would not allocate cars but instead define the contracts on which competitive bidding would occur. A professional staff would forecast demand and capacity using many of the forecasting institutions already in place.

The six month plan[h] would be used to generate trading units based on projected weekly sustainable unloads. The relationship between forecasts and the number of CRCC contracts would be determined by guidelines set down by the RCA.

The Four Month Plan would be used to specify contracts for additional capacity as the planning week approached and the planning picture became clearer. This could occur at the monthly iteration of the Four Month Plan or based upon "weekly sustainable unloads" information supplied by the railways.

By the time of the planning week, a percentage of capacity would be previously allocated. The age of contracts would range from periods of one to six months. The remaining capacity would be auctioned on a spot basis. The only restrictions on qualified bidders would be total cars under control for a planning week, to avoid a market cornering problem.

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[g] This does not presume continuing ownership by the government. Car ownership could be transferred to the RCA based on an amortized loan from the government for the selling price.

[h] The CAPG technical committee currently, "creates the six month working plan (that) takes into account customer demands and operational plans for a six month period...it incorporates car cycles by (combining) traffic corridor information provided by CN and CP, total customer demand, terminal unload capacity and rail fleet availability."

Shippers would have the flexibility to accept cars at any point within either the east or west transportation corridor and the railways the obligation to spot cars within the corridor. Weekly updates relative to the Four Month Plan would be used to report the performance of all parties of the transaction.

5.3 Price Generating Mechanism

The two proposed price generating mechanisms are a sealed bid auctioning of CRCC contracts and secondary bids and offers. The value of the contract is based upon the value of forward car guarantees established in chapter two, i.e., low storage and interest costs, and the ability to lock in margins.

The CRCC would be incorporated into the CSX Railway Express Guarantee bidding process. The cost of an Express Guarantee is in addition to the tariff rate. A reserve price could be set at two levels during the crop year. First a level equal to variable rail car costs would be set during the non-peak season; second, a higher rate that covered total annual rail car costs plus variable costs would be set as a floor during the September to January premium shipping period. The latter is consistent with the peak loading pricing model.

CAPGII would choose both reserve price, number of forward cars and corridors. It could rescind or re-auction cars not picked up in previous forward auctions. The contract sizes would be determined by market demand such as 112 and 56 car units or single cars.

Forward CRCCs would trade in a secondary Internet auction market up until the weekly CAPGII planning meeting. The CRCC becomes a spot contract for delivery at that time. The spot market also includes postings of available equipment offered at the reserve price. This includes unplanned equipment available at terminals or classification yards. Spot equipment could be auctioned at the weekly planning meeting.

5.4 Standardized Contract

The CRCC matures into a receipt call at the conclusion of the planning meeting in the form of a bill of lading. The Bill of Lading specifications must meet regulatory guidelines including the following specifications:

Shipper - The party that physically loads the grain freight.

Consignee - The party that physically receives the shipment for unloading.

Other - Account of grain owner, account of owner at time of shipment, beneficial owner of grain, care of company, who owns grain at time of unloading, certifying of weight party name.

Prior to the receipt call, the CRCC is a negotiable contract under the auspices of the RCA. All trading would take place electronically through the ERCM exchange and

member clearinghouse. The management of both systems could be contracted to a third party, such as Calgary based company called AgriLink Inc. or operated in-house.[i]

5.5 Centralized Transaction Processing

The ERCM can assume a wide range of transaction processing and information service functions. The core functions must cover the clearing of shipper property rights against the obligation to pay for the CRCC. Important additional services will include public access to market information.

The property rights embodied in the CRCC include the obligation of the railways to deliver RCA rail cars within the delivery window. Confirmation of delivery is an important step in this regard. The next confirmation step is unloading time. Unloading time measures the performance of the shipper to unload within a specified time period after loading. The final confirmation is receipt of payment for rail car use. All of this information must be recorded at the ERCM clearing corporation.

The ERCM clearing corporation could be a third party guarantor of rail cars that allowed shippers to offset obligations between different pieces of equipment. The clearing corporation could immediately step in to provide cars where planned unloads did not occur. The clearing corporation would not track specific pieces of equipment but instead

[i] AgriLink has developed prototype exchange systems to trade transportation contracts.

shipper/carrier obligations. The result is that shippers could fulfill the unloading commitments from one set of cars with other cars.

A specific CRCC contract can result in either credits and debits to shippers. The successful delivery of rail cars will of course create a shipping debit. However, shippers could receive credits from trading CRCCs or from RCA penalties for performance failure. Tariff charges, on the otherhand, would remain within the domain of railway order processing systems.

The CRCC database would contain valuable public information. This information would be released in aggregated numbers without reference to the identity of shippers. Both historical and current market information would be available with respect to price, transportation corridor and quantities.

Chapter 6

6.0 Summary and Conclusions

This chapter consists of the summary, conclusions, limitations and areas for future research. The summary capsulates the thesis methodology to first create an electronic market standard and apply it to the discussion of rail car allocation. The scope of the thesis includes a review of rail grain transport and case studies of functioning electronic trading system. The conclusion discusses how Reimers' institutional standard can be applied to the issue of rail car allocation.

6.1 Summary

The impacts of electronic commerce technologies were considered to be primarily an institutional subject matter by this thesis. The advance of information technologies continues to reduce communication, integration and brokerage costs. The benefits flow to those who overcome the institutional barriers of coordinating economic activity between buyers and sellers separated by time and space. Rail car allocation was analyzed from this perspective.

From the farm perspective, the question of who will develop rail car allocation institutions is critical. The private sector can be expected to aggressively build commercial relationships to capture the benefits of combining shipper freight information

with railway capacity information. How these private relationships will impact the public cannot be anticipated. Herein lies the problem.

An open transportation system is not a given outcome of moving from an administered to commercial rail car allocation process. Electronic commerce may ultimately reduce the number of grain shippers (i.e. concentration) if railways and grain companies build exclusive commercial structures to govern the exchange of database information.

The only institutional structure proven to produce both private and public benefits is the theoretical model of perfect competition. Electronic markets are the closest we have come in practice to achieving the theoretical ideal. In electronic markets, individuals are atomistic in their ability to influence price. Atomistic access to rail cars would mean that the relationship between shipper and railway has no bearing on rail car allocation. Shippers that lowered handling costs, or found the best export prices for each and every freight load, would have a forum to express their value for the use of rail cars necessary to deliver grain.

The electronic rail car market defined in this thesis is a close proxy of theoretical market trading that allows the reader to assume both private economic efficiencies and the public benefits of cost-based pricing, rate relationships and competitive access. The specific goal of this thesis was to provide such a model so stakeholders can compare it against railway sponsored e-commerce

The thesis methodology that ends at the ERCM model began with an overview of the administered rail car allocation system. The review included the history of railway regulations and the changes to Western Canadian rail transportation proposed by the Estey and Kroeger processes.

Grain shippers share many of the issues facing other Canadian commodity producers. Transportation freight rates become a zero sum game when commodity prices are set in international markets. Shipping costs have a direct impact on the producer's profitability and even viability. A second similarity is competition between producers at different geographic locations. Historically, these factors led to rate regulations in the form of cost based pricing and rate relationships.

The issue of non-remuneration for the railways was also discussed. Railways can be drawn into "destructive competition" to lower freight rates because of large sunk costs in track, diesel power and rail cars. The inevitable result of non-remuneration is a decline the capital assets necessary to serve shippers, as was witnessed during the 1970s.

The peak grain shipping period creates a problem because the demands of grain shippers can easily exceed the available rail car supply. Under the Canadian regulatory structure, access to rail cars was administered and allocations were determined mainly by entitilements. The Estey and Kroeger reports left the subject of rail car allocation in a deregulated environment open. Although the reports reflect the industry's strong desire to have the Canadian Wheat Board relieved of its responsibility to allocate rail cars,

alternatives are not discussed. The only model of a functioning deregulated alternative is the system used by U.S. railroads.

In the United States, the railways auction forward car guarantees. Notwithstanding the benefits of allowing shippers to competitively bid for cars, the premiums paid to railways for car guarantees was considered a 'non-starter' by Canadian grain industry participants interviewed for this thesis. The industry does not believe that railway premiums would lead to increased capacity to satisfy peak demand.

Rail car allocation alternatives must address the general goals of commercial and competitive relationships expressed in the Estey/Kroeger reports. As previously mentioned, a commercial contract does not always lead to a competitive outcome. The review of the Institutional School of Economics in chapter three discussed the two commercial extremes that define the institutional continuum. The continuum is anchored by vertical integration within firms on one end and the coordination of economic activity in markets on the other.

Whether or not industries move towards their natural spot on the institutional continuum is a valid question. Bakos (1987) identifies the incentive for firms to resist market processes that reduce search costs and in-turn profitability. With respect to integrating electronic commerce technologies, firms may have early mover advantages compared to the critical mass of agreement necessary to form an electronic market.

The inability of an industry to move towards its natural place on the institutional continuum was cited as a problem from the outset. Recall:

> ***"Problem Statement....*****the public interest in support of market-like structures can be difficult to identify. Not only are the public benefits difficult to quantify, but the necessary mutual vision between stakeholders to invest in common electronic commerce processes may be hard to achieve. Specifically, the problem is that there are no standards on which to base the mutual vision upon."**

The subject of rail car allocation is predicated on the issue of whether a significant public interest can be established to justify public support of market-like allocation alternatives. The subject of public interest was played out in the case studies presented in chapter four. The case studies demonstrated different levels of public attention to competition within specific industries. Demonstrating that governments do pick and choose industries where the benefits warrant the input of resources in support of market trading.

Private reservation systems that allocate airline seats were the least regulated. Real estate trading attracts some attention from governments. On the regulatory extreme, the Manitoba Securities Commission supported public access to futures market trading on the Winnipeg Commodity Exchange.

The case studies demonstrate how market processes develop. Trading structures are built on professional associations and contract laws that evolve over time. For example, early Winnipeg grain merchants petitioned the government for grading regulations to address the concerns of their European customers.

Slowly evolving institutional change would not describe the requirements of the Western Canadian grain industry. For the fifty years that preceded the end of the Western Grain Transportation Act, institutional structure was essentially frozen in time. Turmoil in international commodity markets and the loss of transportation subsidies have now made institutional change a pressing matter. Legislative action for the 2000/01 crop year is expected, although the degree of change is uncertain.

The disposal of government rail cars offers the public an opportunity to move the grain handling system towards a market-like institutional structure. Rail car ownership may influence the total number of cars operating in the transportation system, the price of cars and access to the cars. Some participants fear that rail car ownership may create a point in the supply chain where economic rents are extracted. These rents have been estimated as high as $12.6 billion.

A view expressed during interviews for this thesis was that the logic of selling cars to the highest bidding private interests is flawed. Rail car costs would flow back to the farmer's bottom line that was being subsidized on the revenue side through other government programs. The Rail Car Authority model proposed in this thesis allows government to effectively transfer control and/or ownership of its rail cars to Western Canadian grain industry stakeholders.

6.2 Conclusions

Cost based pricing, rate relationships and atomistic access to rail cars are all market-like characteristics that result from competition. The straightforward test of Reimers' theory is to stack up the ERCM against these criteria.

Before considering this question, consider the value of Reimers' standard on its own. The ERCM offered by this thesis may require further refinement and specification, however, criticism of the conceptual model must take place within the standard. If for example the membership structure is not deemed effective, one must offer another membership solution in its place. The standard gives stakeholders terms on which to discuss market-like allocation processes.

The ERCM does score well against the historic rail transportation issues of rate relationships, cost based pricing and car allocation. Each issue is briefly addressed in this conclusion. Some comments on the larger problem of rail car allocation expressed during interviews with industry stakeholders are also included.

Rate Relationships. Rate relationships reduce the effects of transportation costs on competition between producers of primary commodities. The grain industry typifies the competition to sell into common export markets from diverse points throughout Western Canada.

The Revenue Cap has the potential to allow railways to express seasonal, line related and

volume related costs through their tariff schedule. The limit on tariff discounts and premiums is the potential of returning revenue to shippers if the cap is exceeded. The ERCM would encourage the railways to use as little discretion as possible with shippers, perhaps limiting themselves to the waving of penalties for desirable freight.

While the Revenue cap would take care of geographic, and perhaps some seasonal, rate-relationships, the ERCM would create temporal rate differences within those categories. Similar freight from the same geographic locations would have different grain car rates during different shipping weeks.

Cost Based Pricing. Although the ERM cannot alter the reality of the lack of effective railway competition, it does move the rail system towards cost based pricing. Again, if one presumes that the Revenue Cap links railway costs to tariffs, the potential for economic rents is only in the price of the Canadian Rail Car Certificate.

Shippers could pay premiums for CRCC, especially in the early years. However, economic profits would flow back into the grain industry and potentially bring the long term supply of rail cars into an equilibrium where premiums during the peak shipping season would perfectly compensate for the off peak season.

Rail Car Access. The ERCM would ration cars on a priority pricing basis. Shippers could express the value of rail cars through the sealed bid auction and subsequent trading in secondary markets. The ERCM would create competition for shippers to reveal the

full extent of the value of rail cars and would eliminate phantom orders and low priority shipments. Simple trading rules would limit shippers from controlling an undue number of rail cars.

This thesis indirectly addresses the key problem of the Western Canadian grain handling industry. It is the question of how much the system could be expanded to meet the peak shipping period. Debate on this subject is polarized. The railways want to flatten out annual shipments while shippers express a belief that farm incomes could be increased if the system could come closer to meeting peak demand.

The optimum level of peak capacity lies between these extremes. Expanding to meet peak capacity requires more diesel power, more rail crews, more terminal capacity and more rail cars. Freight that travels during the off-peak season improves capacity utilization. Although the question of optimum system capacity is certainly beyond the scope of this thesis, some interesting thoughts on the subject can be concluded.

The question defined by this thesis is the ability of participants to communicate the value and cost of the capacity. The less competition, the more "impacted" valuable shipping information becomes.

The ERCM would create commercial relationships that would move the system towards the optimum capacity. The first is the commercial contract between the RCA and the railways. This contract will be governed by the Revenue Cap that the industry seems to

be satisfied is a close proxy of railway costs. Forward contracting of rail cars would ultimately make railways communicate more information through forward contracts to move forward cars, either in a general contract with the RCA or direct contracting with shippers.

The commercial relationship between the RCA and shippers would definitely have elements of competition. From the seller's perspective, CRCC would be auctioned competitively with many buyers. Competition would force shippers to reveal the value of rail car capacity. Although there may be no competition in the supply of rail cars, the RCA would accept economic windfalls as a price signal to expand the rail car fleet, and provide the RCA with the capital to make such expansion.

6.3 Limitations

A limitation of this model is that the methodology is unproven. Although the potential exists to apply the methodology to other industries, issues such as how to identify an institution? and how do you classify an institution? are legitimate limitations of this thesis.

Clearly a second limitation is that the ERCM is a conceptual model. None of the benefits were considered measurable and the costs of establishing the ERCM were beyond the scope to the thesis. An operationalized test would be necessary to determine the costs and benefits of the ERCM. The net benefits should be objectively measured against the net benefits of vertical e-commerce solutions.

6.4 Areas For Future Research

The testing of the ERCM is certainly a specific area for future research. The first practical test would be to gather stakeholders to discuss the potential for an electronic market to allocate rail cars. Again, Reimers' model provides a standard in which discussions can take place. Simulations of rail car trading could take place thereafter if a critical mass of agreement for the concept exists.

Reimers' standard itself has interesting applications. New electronic trading systems are a common occurrence at the turn of this century. Public auctioning systems such as Ebay are becoming financially viable businesses. Further, an recent agreement deal for Oracle to open the supply chain of a "Big Three" auto producer to competitive bidding seems to confirm Malone, Yates and Benjamin's (1987) prediction that electronic markets will be used to organize an increasing amount of economic activity.

These new commercial electronic relationships beg the questions:

i. Do these relationships pass Reimers' standard?

ii. Were the challenges to these enterprises primarily institutional or technological?

These industries provide further opportunity to test Reimers' theory.

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