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16. Abstract

Since the end of the surplus grain car situation that characterized much of the 1980s, sudden surges in demand have strained the rail grain transportation system with greater frequency, creating recurring problems for shippers and carriers. Public debate has tended to narrowly identify the problem as a grain "car shortage." This study examines the functioning of the grain merchandising/transportation system, of which car supply is only one aspect. It provides a description of the commercial functioning and efficiency of the grain merchandising/transportation system in periods of "normal" and "surging" demand, and an analysis of the trends in rail capacity for grain movement, including factors that affect it.

The study found that the term "car shortage" is somewhat of a misnomer. During periods of peak demand, there have been no reports of grain shortages, i.e., feeders/processors ceasing operation, or long queues of ships at ports waiting to load grain. In many respects, the problem centers on the allocation of profit opportunities among competing grain traders, when profit or trading margins are unusually wide. As one approach to solving the problem, the study recommends the use of market pricing of rail grain cars/grain transport to clear the market and to allocate grain transportation capacity to its most efficient use. Market pricing should also be used to govern access of privately-owned cars to railroad systems.

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EXECUTIVE SUMMARY

This report, *Assessing the Potential for Improved Functioning of the Grain Merchandising/Transportation System*, was prepared by Apogee Research, Inc., for the Federal Railroad Administration. It is concerned with grain-market operations and rail transportation for grain, with particular focus on rail-car supply for grain movement. This study examines the nature and root causes of the phenomenon of rail-car shortages in the grain transportation system.

The true character of car-supply issues and the nature of car shortages can be understood only in the context of the workings of the physical grain market and, in particular, the ways in which grain elevators and merchandisers conduct their business operations, and the ways in which these grain traders relate to one another and to the grain-hauling railroads.

Elevators buy the grain crop from farmers at harvest time or in the following months (significant amounts of grain are often held in on-farm storage) and hold it until they perceive good opportunities for selling; typically, elevators sell to merchandisers who, in turn, sell to domestic processors and feeders, foreign buyers, or to one another. In the late fall and winter, when the car-shortage phenomenon occurs, the upper part of the Mississippi River is closed and virtually all long-distance grain movements are by rail.

For the most part, grain is traded in free and open markets, and it is bought, sold, and distributed in a series of transactions made under intensely competitive conditions. Perhaps not surprisingly, the system works with a high degree of efficiency. End-users get the grain at competitive prices, and feeders and processors do not have to carry large inventories; they trust the system to provide grain in the amounts and at the times desired.

The one area, perhaps the only one, in which this system does *not* work efficiently is that of allocation of grain cars among competing shippers in times of peak demand for grain and for rail movement of grain. Presently, the market has only a limited role in grain car allocation; there are significant regulatory and institutional restraints on both railroads and grain traders in this regard.

This study seeks to provide a clear understanding of what the car-shortage problem is, and what it is not. The phrase "car shortage" implies, or is often taken to mean, that the rail system's capacity to move grain is somehow inadequate in a car-shortage period. In fact, car shortages, and certainly those that have occurred since 1987, occur when the system is working at maximum capacity, moving large amounts of grain. Discussions with elevator managers and key people at grain merchandisers revealed no reports of major transportation failures (since 1980) in the sense of processors or feeders not receiving grain in a timely fashion or exporters forced into default or payment of heavy ocean demurrage.

The problem is not that grain fails to reach buyers. In peak-demand times, high cash bids for grain, combined with inflexible rail rates, create attractive trading opportunities.

The system cannot accommodate all the traders that want to ship grain at existing transport rates in a peak-demand period. *If they could all ship, the high cash bids would come down and the attractive trading margins would shrink drastically.* Thus, the real problem is that inefficient, non-market methods are used to allocate scarce grain-transport capacity among competing users of rail grain transport. Further, the same factors that cause inefficient allocation also act to restrain investment in rail grain capacity.

THE ALLOCATION PROBLEM

When demand for grain cars increases sharply, typically in late fall and winter in response to export sales, railroad rates do not rise to market-clearing levels. For both legal and other institutional reasons, rail rates are sticky and tend to resist upward pressure. Railroads can, of course, make changes in the tariffs for grain shipment. However, the current requirements impose a 20-day advance filing for a rate increase. In a fast-moving grain market, this appears to be a significant restraint on pricing flexibility. As a consequence, peak demand for grain transportation may exceed the available supply; at the prevailing prices, railroads will not be able to provide cars and service to all customers in a short time period.

As long as a non-market allocation system is used, this situation will recur. There is no economic justification for carriers to buy enough grain cars, and make other necessary rail investments, to move all the grain that traders want to ship at a peak-demand time when carriers are receiving non-peak rail transport rates. Thus, when demand for rail transport of grain rises high enough and rail rates do not rise in response, railroads will face demand for more service than they can provide.

Some or all railroad customers will be compelled to accept delays, uncertainty, and the inability to ship at what they perceive as the optimum time. Under current institutional arrangements, this situation is inescapable. The only alternative is to invest in too much grain-carrying capacity, which would be idle for much of the year.

Some rail grain-transport rates are flexible. Leased-car rates and secondary-market prices for Burlington Northern (BN) certificates of transportation (COTs) fluctuate freely; further, both BN COTs and Soo Line's certificates are initially sold in auctions (called, by the Soo, Protected Equipment Rate Exchange (PERX)). Not enough cars are priced and allocated in this way, however, to prevent shortages from occurring. Further, some railroads pursue policies that restrict grain traders' flexibility to use private cars.

In the absence of significant institutional change, grain-car shortages will recur fairly regularly and the costs imposed on traders and farmers by inefficient allocation of grain-transport capacity will be a permanent feature of U.S. grain marketing. Within the scope of this study, we have no way to quantify the costs stemming from this inefficiency, but this is where the true economic costs of car-supply problems reside. When demand for grain cars

rises to the point where the system comes under strain, cars are allocated not to those who can make the most economic use of them, but, in effect, to those who win a lottery.

THE CAPACITY ISSUE

No strong analytical basis was identified for judging whether the available supply of covered-hopper cars is the economic optimum. There are, however, good reasons for believing that the fleet may be somewhat sub-optimal. After a long period of decline the total number of C-113s (the type of covered hopper used for grain carriage) in service has begun to increase slightly, and there is no indication that the proportion of these cars used in grain service has diminished. Thus, some investors (railroads, apparently) now believe that an increase in grain-movement capacity is justified.

Importantly, the same institutional factors that cause shortages and inefficient allocation of rail cars also act to suppress investment in rail grain-transport capacity. In different ways, both railroads and other investors are discouraged from investing in grain cars by the current set of institutional arrangements. Railroad incentive to invest in grain cars is dampened by the restraints on upward flexibility of rail rates. Rail rates do not move up with the market in a demand surge, so rail carriers do not receive the revenue increase that would flow to them from increased rates. In the absence of market-clearing prices for rail grain movement, part of the peak demand is converted into delays, uncertainty, and missed opportunities (from the point of view of the grain trader) and part becomes revenue for those grain traders who, through leased cars or otherwise, control grain cars.

Incentives to private lessees of grain cars to increase the number of cars they hold are reduced by railroad restrictions on entry of private grain cars. The current rule, embodied in a 1989 decision of the Interstate Commerce Commission (known as SCOT-5), is that a railroad may refuse entry to a customer's private cars as long as the rail carrier is willing to provide grain cars to that customer. This necessarily restricts the opportunities for grain traders to use their own cars.

REMEDIES

One attractive arrangement explored here involves the removal of the institutional restraints on both rail rate flexibility and access for private grain cars. The analysis suggests that these two changes are inextricably linked; neither can work without the other. If railroads have full rate flexibility and the power to restrict private cars, the balance of market power would tilt too much in their favor. On the other hand, if private cars have free access while railroads do not have pricing freedom, grain traders holding cars are in a position to take financial advantage of both railroads and other grain shippers. The answer is for railroads to be free to set prices on grain cars and movement and for private-car holders to have open access to railroads, with the railroads free to offer whatever payments for private cars they find appropriate.

Under such an alternative arrangement, dealings among railroads, shippers, and private-car holders become more market-based. Grain-shipment capacity under peak-demand conditions would be allocated to those operators that are most efficient or have the best trading opportunities. Dealings between railroads and grain traders with respect to private cars would be based on supply and demand in the market and neither group would gain a consistent advantage over the other. Economic returns from holding grain cars should increase, and, other things being equal, the size of the grain-car fleet should increase (although not necessarily dramatically).

CHAPTER I

INTRODUCTION

BACKGROUND

The transportation of grain products by railroads has been a focal point of transport policy for many decades. Episodes in which many shippers were unable to obtain grain cars in a timely fashion ("car shortages") were a recurrent feature of the U.S. grain marketing and rail transportation system in the 1970s.

Car shortages disappeared in the early to middle 1980s (1980-86) when, for a variety of reasons, especially including heavy investment in cars in the late 1970s and a collapse of U.S. grain exports in the first half of the 1980s, the available supply of cars was quite large relative to the volume of grain to be moved. As the 1980s wore on, the grain-car fleet shrank steadily through attrition. Then, in the second half of the decade, exports recovered. Significant car-shortage conditions occurred in the late fall and winter of 1987/88 and again in 1989/90; and in some grain-growing regions, especially the Dakotas, there were car-shortage episodes in the winter of 1992/93. More generally, people in the grain trade report at least some periods of difficulty with car supply in every winter since 1987/88.

For grain traders, and for railroads that haul grain, these episodes pose a variety of operating problems. Car-supply issues are also the subject of continual debate and discussion in the public-policy arena. The Interstate Commerce Commission (ICC) found the matter to be of sufficient concern that it convened a conference of interested parties for discussion of the issue in September 1990.[1] At that conference, and in other discussions, questions were raised concerning the adequacy of the grain-car fleet, the merits of railroads' methods for allocating cars in times of peak demand, the proper role for private cars, and related issues.

The Federal Railroad Administration (FRA) contracted with Apogee Research, Inc., for this study in order to secure a better understanding, for itself and for the public, of the true nature of (1) car-supply problems in terms of the commercial operations of grain elevators and merchandisers and (2) the performance of the system in terms of the movement of grain from country elevators to domestic end-users and export terminals.

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[1] Ex Parte 490, Grain Car Supply, Conference of Interested Parties, September 18, 1990.

APPROACH TO THE PROBLEM

The FRA chose to have the contractor approach the problem by first analyzing how grain elevators and merchandisers conduct their ordinary business operations and how their operations and practices change in periods of peak demand for grain movement. This report contains two main chapters and comprises the following main elements:

CHAPTER II: Grain Market Operations and Car Supply Issues

- Description and analysis of the modes of conducting business of country elevators, grain merchandisers, exporters, end-users, and railroads with respect to buying, selling, and shipping grain, with particular reference to supply and allocation of grain cars, and how car-supply problems affect and are affected by the business conduct of these market participants during times of peak demand for grain and grain movement.

- Assessment of the performance of the system under peak-demand conditions in terms of timely movement of grain from country elevators in producing regions to domestic feeders and processors and to export elevators at dockside.

- A synthesis of the results of the foregoing analysis in terms of the nature and significance of car-supply problems and the nature of the economic costs imposed by car-supply problems.

CHAPTER III: Trends in Rail Capacity for Grain Movement and Factors Affecting It

- Presentation of recent trends in investment in rail capacity for grain movement.

- Discussion of government actions that affect demand for grain movement and railroad actions that affect rail capacity for grain movement.

- Assessment of the institutional forces (legal, political, and other) that affect investment in rail grain-movement capacity, together with consideration of how changes in the institutional context of rail grain movement, as it influences both railroads and grain traders, might offer a remedy for current problems relating both to car supply and allocation and to the level of investment in rail cars.

METHOD OF ANALYSIS

Although a substantial amount of quantitative data was considered in the conduct of the study, the principal foundation of the work is qualitative analysis based on judgments and

insights gained in extensive discussions with people who work in this market on a daily basis. This is especially true of the descriptive analysis of business operations of market participants.

Unless otherwise cited, the factual information on the conduct of grain-marketing business and related railroad business, especially that in Section A of Chapter II, is based on discussions with key personnel at grain elevators, merchandisers, and railroads. Firms with whose representatives we had discussions (either in person or by telephone) are listed in the Appendix.

The principal investigator for this study was Mr. Eric W. Beshers. Dr. Richard R. Mudge, president of Apogee Research, provided overall guidance, and reports were prepared under the supervision of Dr. Porter K. Wheeler, Apogee's Director of Surface Transportation. Much of the information on grain market operations was contributed by those members of the study team who are engaged in the grain business on a daily basis: Mr. Jerry Van Der Kamp, Chief Executive Officer, Agri Industries, Inc., West Des Moines, Iowa; and Mr. Thomas Feldmann, Marketing Manager, West Central Cooperative, Ralston, Iowa. The other outside members of the study team were Professor C. Phillip Baumel, Iowa State University, and Mr. Darius W. Gaskins, High Street Associates.

Many individuals were generous and forthcoming in sharing their expertise and experience with us. In order to ensure open and free discussions, we assured these people that neither individuals nor institutions would be cited as sources for any particular statement. We offer here, however, an acknowledgement of our substantial debt to a large number of people in the business of trading or hauling grain who freely and unstintingly offered information, opinion, and insight and who kindly tolerated repeated telephone calls as we sought greater understanding or clarification of one point or another.

CHAPTER II

GRAIN MARKET OPERATIONS AND CAR SUPPLY ISSUES

FOREWORD

This chapter presents description and analysis of the rail grain-transport market under peak and non-peak demand conditions.

Analysis and findings are presented in three sections:

SECTION A—BEHAVIOR OF GRAIN MARKET PARTICIPANTS

Descriptive analysis of the behavior of market participants under non-peak and peak demand conditions—how, in different ways, grain traders, processors, and railroads cope with limited availability of grain cars.

SECTION B—RAIL GRAIN-FLOWS AND SYSTEM PERFORMANCE

Analysis of rail grain-flows and system performance under peak-demand conditions.

SECTION C—SYNTHESIS

SECTION A—BEHAVIOR OF GRAIN MARKET PARTICIPANTS

This section is presented in three parts: *BACKGROUND*, providing basic information on the character of market participants and the rail transport provisions of grain sale contracts; *RAILROADS*, concerning rail carriers' methods of allocating cars in peak-demand conditions; and *GRAIN MARKET OPERATIONS*, describing the manner in which grain market participants conduct their business in peak and non-peak demand conditions.

BACKGROUND

Market Participants

The physical grain market, together with its vital adjunct, the Chicago futures market, constitutes a complex and highly efficient mechanism for the gathering, storage, and distribution of grain over the year from one harvest to the next. Like most agricultural commodities, the total annual supply is produced at harvest time, but is consumed (though not shipped) more or less evenly over the course of the year. (Export shipments may be quite volatile, and some of the grain produced in a given year may be stored and not consumed at all in that year.) Grain is produced by farmers, and collection and distribution is accomplished by the intermediate operators in the market—country elevators and merchandisers—who buy grain from farmers and sell it on to end-users, both domestic and overseas. The end-users are processors and feeders. Briefly, the roles of these various operators are as follows:

— The Farmer produces grain and sells it, primarily to country elevators, but also to processors and feeders.

— The Country Elevator buys grain from farmers, holds it in storage facilities (some for a brief period, some for several months), and, when it judges the right time has come, sells it to merchandisers or end-users.

— The Merchandiser buys from elevators or other merchandisers and sells to other merchandisers, exporters, or domestic end-users. The merchandiser takes legal possession of grain but does not always take physical possession. Merchandisers do buy grain and hold it in storage for several months, just as elevators do. On the other hand, a merchandiser will also engage in short-term transactions in which it owns the grain only while it is in transit from the seller to whomever has bought it from the merchandiser.

— The Exporter buys from elevators or merchandisers and sells to foreign buyers, usually governments. The export function is a special case of the merchandising function. Typically, but not invariably, the exporter makes the sale first, then buys the grain.

— The Processor buys grain from farmers, elevators, or merchandisers, processes it, and sells it for further processing, manufacturing, feeding, or final consumption (e.g., Quaker Oats processes grain into breakfast cereal).

— The Feeder buys grain from farmers, elevators, or merchandisers and feeds it to cattle, hogs, chickens, or other animals.

Some firms will perform more than one of these roles. Exporting, we have just noted, is a special case of merchandising; most exporting firms are also domestic merchandisers. A number of large and middle-sized merchandisers are grain conglomerates that may own processing plants, elevators, or both. In this report, when we consider the behavior of merchandisers, we are concerned only with the merchandising function, not with other possible elements of a conglomerate.

Another function of some merchandisers is that of terminal operator. Terminals are intermediate storage elevators, almost invariably owned by merchandisers. Terminals are used to store (and sometimes blend) grain for a fee for customers who may be merchandisers, other market participants, or the Federal Government. Merchandisers will also use terminals to store and blend their own grain, consolidating shipments and holding them in anticipation of later sales. The amount of grain stored in terminals has been declining, and many observers of the grain business believe that there is a limited economic future for this function. Terminals are now used largely for wheat; they have virtually disappeared from the corn trade.

Country elevators will also store grain for a fee. Terminals that serve as intermediate storage facilities are not to be confused with "river terminals," which are rail-to-barge transloading facilities, or export elevators at dockside, sometimes called "export terminals," which are primarily facilities for loading ships.

Although the farmer is not a direct buyer of rail transport, he is an important market participant. A significant number of farmers will sell their grain at harvest time. Many others, however, will keep some or all of their crop in on-farm storage (especially true for corn) or store it in an elevator for a fee. In effect, these farmers take a speculative position; they will hold their grain until they believe they can maximize their gain. Farmers' decisions on when to sell can have a significant effect on when elevators ship. Farmers usually haul grain to elevators (or to processors or feeders) in their own trucks (occasionally, but rarely, in for-hire trucks).

Rail-transport Provisions in Grain Sale Contracts

Most rail grain shipments originate at a country elevator. Contract provisions of particular interest are those having to do with transportation cost and with the burden of responsibility for obtaining cars in a timely fashion.

Almost invariably, the buyer will pay the rail carrier for the move; however, an amount representing transportation cost will be deducted from the bid price before the buyer pays the seller. Usually, this is done in one of two ways. Grain is sold "delivered" or FOB origin (also called "track"—a reference to the track at the seller's elevator). The general meaning of these terms is as follows:

Delivered: The sale contract specifies a place (e.g., Houston) to which the grain may, or may not, be going. At the time of payment, the buyer will usually subtract from the contract price a figure based on the railroad tariff rate, in effect on the day the seller loads the grain, for the move from the origin elevator to the delivery point specified in the contract.

FOB origin: The sale contract does not specify a reduction for transportation, but the nominal bid has been reduced to allow for the cost of hauling the grain from the seller's track to the destination.

Either way the price is established under competitive conditions, and the buyer's bid reflects both his judgement of the market and what he thinks the transportation will actually cost (he may not be certain of the price of transportation when the contract is made). In the case of grain sold on a delivered basis, the tariff rate to the delivery point may or may not be the actual cost of the move. The actual cost may be more or less, depending on the actual destination and the buyer's arrangements with the railroad (and possibly with other parties for car supply); for example, the grain may be moving under contract at a discount from the tariff rate. It should be noted that if the buyer is a merchandiser, the elevator will not know, at the time the sale agreement is reached, where the grain is going—and the merchandiser may not know either.

Responsibility for car supply is fixed according to whether a contract specifies seller's equipment or buyer's equipment. In the former case, the burden falls on the seller, and he is liable for penalties if he cannot load grain in the time specified in the contract. In the latter case, the responsibility is the buyer's; if he cannot arrange for placement of cars on the seller's track within contract requirements, he is exposed to a penalty. Elevator managers told us that most grain sales are on a delivered basis, seller's equipment, particularly in Iowa and the plains (Kansas, Nebraska, and the Dakotas). In the eastern corn belt (Ohio and Indiana), sales on the basis of unit-train loads appear to be less prevalent than in the mid-West; elevator representatives there told us that multi-car sales are likely to be seller's equipment, but trainload sales are often buyer's equipment.

It should be noted that, although liability for failure to load cars on time is determined by whether a sale is on the basis of buyer's equipment or seller's, this provision does not necessarily determine which party actually arranges for the cars. It is not at all uncommon that the buyer supplies the cars under a contract that nominally calls for seller's equipment. Formal liability is not shifted, but, in an arrangement reached outside the contract, the buyer agrees to provide the cars.

RAILROADS

Railroad car-allocation practices control the placement of, probably, 65 percent to 70 percent of the grain-car fleet. Observers variously estimate that 40 to 50 percent of the grain fleet is held under lease by non-railroad firms, mostly merchandisers. However, perhaps as many as 40 percent of these private cars are leased from merchandisers to railroads and are under railroad control. In this section we set out briefly the prevailing practices of railroads with regard to grain-car allocation.

Virtually by definition, car-allocation systems have meaning only in the context of a peak-demand period. In non-peak periods, railroads and other car holders have cars available; customers have only to order cars and they will get them from a railroad at tariff rates (which some railroads may have lowered for off-peak conditions). Other parties holding cars may offer discounts in order to find a use for their cars. In peak-demand periods, however, railroads cannot supply cars to all customers at the times wanted (at prevailing rates) and must have some way, other than price, of deciding how to allocate the grain cars among competing users.

Most railroads do not have formal, published car-allocation rules or practices (beyond tariffs specifying procedures for ordering and canceling cars and related matters). The railroads that do have formal car-allocation systems are the two largest grain-hauling carriers, the Burlington Northern (BN) and the Union Pacific (UP), and the considerably smaller Soo Line. In general (and with some reservations to be noted), car-allocation systems can be grouped under three headings:

— Market-based (BN and Soo Line);

— Union Pacific;

— All others.

In different ways, the formal allocation systems are designed, in part, to even out the volatility of demand for rail grain movement or at least make it predictable, so that it will be more amenable to the operating practices of railroads. These systems allow customers to make advance arrangements for guaranteed car placement. The advantage for system efficiency is that customers commit themselves to shipping at certain times in certain amounts, so the railroads can plan their operations well in advance. The railroads strive to honor their guarantees to customers who participate in these programs; an inescapable result of this is that customers who do not participate receive lower priority in car allocation.

BN's Certificates of Transportation (COTs) program is essentially a form of auction for forward sales of grain transport. Soo's Protected Equipment Rate Exchange (PERX) is also an auction for future transport, but with some significant differences from COTs. UP's

Advanced Car Ordering System (ACOS) allows customers to order cars in advance, but rations cars according to historical use at any given facility.

In the BN auctions, a bidder has a choice of buying COTs for BN's northern or southern territory (i.e., for origin anywhere in one of those territories) and for wheat or corn (which includes soybeans and milo). Once purchased, COTs can be switched between territories for a fee (currently $75 per car); COTs cannot be transferred between grains. COT auctions usually begin five months ahead of the period (first or second half of a month) when the cars will be placed and continue (weekly) until the month preceding placement or until all cars allotted to the program (no more than 40 percent of the fleet according to BN) are sold. COTs can be, and are, freely traded in the secondary market. COTs may be bought for 27- or 54-car unit trains for corn (26- or 52-car trains for wheat or soybeans), or for singles in multicar sets up to 15 cars. (The purpose of this latter provision is to establish a segregated market for shippers that cannot load, or do not want, unit trains.) COT buyers must make a 25-percent prepayment (less interest accrued to the time the cars are placed). A customer who fails to exercise a COT forfeits his prepayment plus, sometimes, an extra payment.

BN customers who do not buy COTs at auction have three choices: they can buy COTs later in the secondary market; they can order trains or cars under the ordinary tariff (called "system cars" or "tariff cars"); or they can buy so-called "guaranteed cars" in the BN carpool. Cars are guaranteed to customers who have placed their own cars (owned or leased) in the BN pool under leases that usually run for one or two years. As part of the lease agreement, such customers are guaranteed a fixed number of cars each month; they are free to sell their claims on these guaranteed cars to any other BN shipper. UP and Santa Fe also operate carpools, although not all arrangements are the same as the BN's.

BN recently (August 5, 1993) announced a significant change in its rules for ordering unit trains under the tariff. Previously, BN took telephone orders for trains and allocated them among customers according to time of placement of order, operating considerations, and other factors. Orders, once placed, were carried forward continually until the cars were placed or the order canceled. Under the new arrangement, shippers order by fax at the beginning of one month (the first Monday-Tuesday-Wednesday) for trains in the next month. No later than the following Wednesday, those shippers to receive trains are notified; all unfilled orders are dropped. Available cars (cars not committed to COTs or to less-than-train orders) are allocated among BN's six distribution districts according to historical usage in that month for the three previous years. Each order is assigned a random number (computer generated) and trains for a district are allocated to shippers according to these numbers, with the proviso that no shipper gets more than one train per location in a month until all locations requesting trains have been assigned at least one train. The process is repeated in the following month.

Like COTs, Soo's PERX program is an auction; once a month (the second Wednesday), a fixed number of cars (not to exceed 25 percent of the Soo fleet) is offered for

the first and last half of each of the following six months. Bids must be submitted by noon that day, by fax or electronic bulletin board. Bids must be for a minimum of five cars, but the market is not segregated between unit trains and smaller orders. One significant difference from COTs is the reservation price[2]; BN sets a reservation price for each auction, sometimes a slight premium over the tariff, sometimes a slight discount. The Soo has one reservation price, $250 per car below tariff, for all auctions. Another difference from COTs, perhaps more important, is that the PERX certificates are origin-specific. They are good for loading only at a specified location and, thus, cannot be traded. If the holder of a PERX certificate does not load the cars in the specified shipping period, he forfeits the $250-per-car advance deposit.

Under UP's ACOS system, customers may place advance orders for guaranteed cars, but allocation is governed by historical usage. For a given month, a shipper is allotted a "carloading base" for each facility (country elevator or storage terminal); the base is the average car loadings at that facility for that month for the four previous years. For a given location, the base for October 1993 will be the average of loadings at that location for October in the years 1989–1992; and the cars will be guaranteed for placement in October. UP undertakes to provide customers with data on their bases at least 90 days before the placement month; i.e., the base for October will be made known around July 1. Customers may order cars against their bases up to one month before the placement month; cars for October have to be requested by the end of August.

The UP tariff specifies that the base is for a location, not for a firm; thus, if a facility changes hands, the base goes with it. If a firm does not order all the cars in a base, UP will add the cars not taken to the pool of cars available to all customers on a "standby" basis, and the base for that facility will be lower in the following year. If a firm wants more cars at a facility than are available in the base, it must order on a standby basis and take its chances. Standby orders do not carry over from month to month; orders not filled at the end of a month are automatically canceled. The base for a given month can be increased only if a shipper succeeds in obtaining standby cars for that month.[3]

All the other railroads, those that do not have formal allocation rules, generally use some combination of "first-come, first-served" and various considerations of operating efficiency, customer relations, and other factors that may affect profit, whether short-term or

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[2]A reservation price is a minimum price below which bids will not be accepted.

[3]About a year ago, UP did offer an alternative way (called "Tier 2") to increase the base, but it found little acceptance and is no longer available. Tier 2 worked as follows: if a customer took all its base at a given facility for a whole year and agreed to a cancellation charge of $300 per car (instead of $70 per car), UP would guarantee additional cars above the base and increase the base accordingly in future years.

long-term.[4] Most railroads are receptive to orders placed well in advance and will often give them priority, but make no guarantees. There are some interesting variations on these general terms. The Soo Line, for example, has no formal allocation system for its tariff cars, but takes orders up to six months in advance and, generally, allocates cars for any given want date in strict priority according to the dates on which orders for that day were placed. The Chicago, Central, and Pacific (CCP), a regional carrier operating in Iowa and Nebraska, encourages advance orders but lets all customers know that there is a limit of one train (25, 50, or 60 cars depending on the customer's track) per location per week.

Through agreements of one kind or another (some are contracts, some are not), a number of railroads will guarantee car availability to a large receiver by dedicating some number of trains to that receiver for some facility or some set of facilities (e.g., processing plants). This practice, in effect, assigns control of the trains to the receiver as long as it can keep those trains fully occupied. Among other things it may undertake to do, the receiver gives the railroad as much advance information as possible on where the trains will be wanted, in order to minimize the railroad's operating problems. In essence, this is the nature of the "Cycle Train" program of the Chicago and Northwestern (CNW). Some eastern carriers that serve large numbers of processors and feeders make similar arrangements with some of their customers but do not assign any particular public label to the practice. Railroad representatives and grain traders told us that typical contracts for grain transport contain provisions regarding rates and minimum volume requirements but do not address car supply.

An option open to some shippers is the use of private cars, i.e., cars owned or held under lease by some shipper or party other than a railroad. Most railroads allow shippers to use private cars at the shipper's option; shippers either receive a rebate from the railroad or pay a lower rate for the move. The BN imposes a restriction on the use of private cars that, as far as we know, is unique to the BN. The BN (aside from its carpool arrangements) will not allow customers to use private cars unless the BN is unable to provide its own cars; in other words, if BN grain cars are available, customers have to use BN cars.

The rebate offered by railroads for private-car use is frequently in the form of a "mileage allowance," i.e., so many cents per loaded car-mile. Some railroads have dual tariff rates for a given grain move, one that applies when the railroad's cars are used, and one that applies when the customer's cars are used; e.g., $1,450 per car if the carrier provides equipment and $1,000 per car if the customer provides equipment. Such rates suggest the existence of two markets, one for cars and one for moving the cars.

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[4]The Chicago and Northwestern does offer an arrangement called a "car supply agreement." For a premium of $100 per car, they will provide guaranteed cars on fairly short notice. This arrangement is, however, used only rarely.

Some railroads vary the payment they offer for private cars with shifts in grain-car demand. These carriers will raise the allowances they offer when car supply is tight and drop the allowances as cars become plentiful. Some railroads do the same with their tariff rates for moving grain. Other railroads do not follow this practice, choosing not to consider these demand fluctuations in their rate setting.

GRAIN MARKET OPERATIONS

Country Elevators

Normal Mode of Operation

The country elevator buys grain from the farmer, holds it for a time, and sells it up the supply chain to merchandisers, processors, and feeders. The elevator works in an annual cycle that starts with the harvest. It buys more grain at harvest time (a period of roughly two to three months) than at any other time of year, but typically buys less than half the year's total at the harvest. The farmer decides when to sell; the elevator has little or no influence on the decision. When farmers want to store grain at an elevator and postpone their selling decisions, elevators will hold the grain in storage for a monthly fee.

The elevator will pay the farmer cash (almost always borrowed cash). Within hours, the typical elevator will cover its position with the sale of a futures contract (but not the actual grain) for an equivalent amount of grain on the Chicago Board of Trade (generally referred to simply as "the Board" or the "Chicago market"). This cover or "hedge" protects the elevator from a downward movement in grain prices (but also limits the elevator's profit from a price increase). With the hedge in place, the elevator holds the grain and watches the market, waiting for a favorable time for a sale. (Not all elevator transactions follow this pattern, but the great preponderance do.) Because of the hedge, the elevator is not concerned with the absolute level of the local cash price or the Chicago futures price. It is concerned with the relationship between these prices. As the delivery month approaches,[5] the cash price and the futures price will tend to converge. The higher the cash price in relation to the futures price, the greater the profit to the elevator.

The relationship between the cash price and the price of a futures contract is called the "basis." If the cash price is low compared with a futures price, the basis is low (sometimes called a "wide basis"); the basis increases as the cash price rises relative to a futures price (sometimes called "narrowing"). During the months following harvest, the elevators follow the market closely, judge how much further the basis will improve and

[5]If the elevator sold a March contract, then delivery at Chicago is promised by the end of March, and March is the delivery month. The elevator will not deliver, but will buy a March contract (using the proceeds of the cash sale of the grain) to eliminate its delivery obligation—this is called "lifting the hedge."

when, and compare the gains from waiting with the cost of continuing to hold grain (the "carrying" cost). In making this judgment, market participants give particular attention to the differences between prices of futures contracts for delivery for the next several months.

Ordinarily, the prices of farther-out futures contracts will be higher than nearer ones. For example, the March contract will trade at a higher price than the January contract, the May at a higher price than the March, and so forth out to the time for the next harvest. There are two basic reasons for this: one is that stocks of grain diminish as time passes so cash prices can be expected to rise; the second is that, as carrying charges cumulate, the prospect of higher prices in the future is necessary to cause people to continue to hold grain.

Since people expect that cash prices and futures prices will ultimately converge, wide spreads between futures contracts are taken as a sign that cash prices will continue to rise relative to futures prices. For example, if an elevator has sold a March contract, and there is a wide spread between the March contract and the May contract, the manager will buy out of the March and sell the May, rolling his position forward in time. When spreads are wide and the basis is wide, people speak of a "carrying-charge" market or simply say that there is "carry" in the market, meaning that the prospects for basis improvement are good enough to justify the cost of carrying grain. As the spreads narrow and the basis narrows, the carry goes out of the market. If there is a sudden and strong surge in demand for cash grain, the spreads will not just narrow, they will invert; i.e., the price of grain for nearer delivery will rise above the price of grain for farther-out delivery. This is called an "inverse" market and is, of course, a strong signal to sell, and move, grain immediately.

Each working day, the manager may call a dozen or more potential buyers and check various electronic bulletin boards to assess cash bids, while following the futures prices in Chicago. He also monitors car-supply conditions. When the manager concludes the carry is nearly gone—i.e., that further gains in the basis will not justify the cost of continuing to hold grain—and he believes he can obtain cars, he decides to sell. All the participants in the market, including the railroads, watch the basis and the spreads as leading indicators of demand for grain transportation.

Like the elevator, many farmers know they are likely to increase their earnings by holding grain for several months after the harvest. These farmers will hold grain in on-farm storage (or pay the elevator to store it) as they wait for the market to rise. A big crop will tend to force more grain onto the market at harvest time as on-farm storage fills up.

There is considerable variation in the scale of elevators' operations. Small ones have elevators at only one location and handle perhaps two or three million bushels a year. Large ones may have facilities at a dozen or more locations and handle 30 million or more bushels a year. Many elevators are cooperatives, owned by farmers in their districts, but this is not true of all of them. Some are ordinary for-profit firms; some are owned by merchandisers (and some merchandisers are cooperatives owned by elevators).

From our interviews, it appears that a typical middle-sized grain elevator operation may consist of facilities at six or seven locations; among them, there may be service from one railroad or more than one. Because of rail abandonments, one or more of the locations may have truck service only. For this and other reasons, it is useful to take note of the role of trucking in the conduct of a country elevator's business.

When an elevator comprises several locations, some with rail service, some without, the problem of the truck locations is generally dealt with in two ways. One is to use the truck locations as a source of grain for markets that are better served by truck than by rail. These would be feeders, processors, and river terminals within the economical range of a truck haul. The length of that range appears to vary by region. Generally, elevator marketing people speak of truck hauls to end-users of 50 to 100 miles, and somewhat longer in some regions (e.g., North Dakota). The second way of dealing with the problem is to haul grain from the truck locations to the rail locations. Both these practices are in common use. At times, the move from a truck-only location to a rail facility will be between elevators under different ownership.

Truck shipments are not limited, however, to truck-only locations. Loading trucks is less efficient and, generally, more difficult than loading railcars. Nonetheless, truck moves from rail-served locations to not-too-distant feeders or processors do occur when the market makes them profitable.

Trucking is also, of course, the dominant mode for farmers' delivery to the elevator, and there are significant changes taking place in the farm-to-elevator move that affect inter-elevator competition and can affect the impact of car shortages on the farmer. In Iowa, a noticeable volume of corn is still hauled to the elevator by tractor and farm wagon. This is not the case in wheat-growing areas, and the trend in Iowa, and elsewhere in corn country, is towards trucks; for grain farmers generally, there is a clear trend towards trucks larger than the standard farm truck. Farmers are using ten-wheel trucks, and, increasingly, 18-wheel tractor-trailer rigs (suitable second-hand ones can be had for $15,000–$20,000). Grain can be moved in such a rig at a marginal cost of 0.13 cents per bushel-mile.[6] In other words, each additional ten miles on the move from the farm costs the farmer 1.3 cents per bushel.

The ability to move grain at such a low cost widens the choices open to farmers. They can reach out to more distant elevators for better bids, and they can sell directly to processors or feeders, bypassing elevators and merchandisers altogether. There is considerable regional variation in the distances from which elevators draw grain. Iowa elevator managers and grain trade observers stated that Iowa facilities will rarely receive grain from more than 15 miles away. In wheat country, grain traders stated that elevators' drawing areas will often have radiuses of 20 to 30 miles or somewhat more, and some grain

[6]Based on analysis of cost data provided by a farmer supplying grain to a western Iowa elevator.

may move as much as 100 miles from farm to elevator. This was reported as a fairly common occurrence for soybeans in some parts of North Dakota. The comparatively dense elevator coverage in Iowa is due, at least in part, to the fact that corn yields 120–140 bushels per acre, while wheat yields about 40 bushels per acre.

Farmers with semi-trailers may readily haul grain as much as 50 miles—and often farther—to an elevator, river terminal, feeder, or processor. Presumably, in a situation where it is economical for an elevator to truck grain 100 miles to a processor, the same may be true for a farmer who has a semi-trailer. What is important for this discussion is not the exact distances that grain may move from the farm gate to the first buyer, but the fact that the trend towards larger trucks for producer delivery widens the options open to the farmer and increases competitive pressures on elevators. An elevator cannot function without the farmers that supply it. At harvest time, many farmers will tend to use their local elevator even when its bids are slightly lower than other elevators; because they are busy with the harvest, these farmers want to minimize the time spent in delivery to the elevator. In the months following harvest, however, many farmers will compare bids from several buyers and sell to the one that generates the most profit. An elevator that consistently bids lower than its competition will see its supply of grain and its turnover shrink over time and may risk going out of business.

Operations in Peak-demand Conditions

When elevators experience difficulty in obtaining cars due to peak-demand conditions, they may be exposed to losses from:

— Inability to buy grain from farmers because of full elevators.

— Losses from deteriorating grain.

— Penalties for failure to load cars in the time period specified in the contract.

— Inability to take advantage of market opportunities because cars are not available at the opportune time or availability is highly uncertain.

Full Elevators:

An imperative for elevators is to have storage space available for farmers who want to sell. Less than half of all grain is sold at harvest; the rest comes in to the elevators in the course of the year. The elevator that refuses a farmer's grain for lack of space loses sales volume and risks losing that farmer as a source of supply (and as a customer for fertilizer, seed, and machinery that the elevator may sell). The elevator also misses the chance to buy when the farmer wants to sell, likely losing an opportunity to buy on advantageous terms. Inability to ship and keep space free in the elevator, due to lack of cars, is most likely to

occur in peak-demand conditions, just when the elevator wants to move a high volume of grain through its facility.

How often an elevator must ship in order to keep space available depends on the ratio of turnover to storage capacity. In Iowa, where elevator capacity is plentiful relative to production, grain traders told us that many operations will turn over their capacity less than 1.5 times in a year. In wheat country, elevator capacity is not so abundant and we found in discussion with elevator managers that annual turnover rates of five or more are not infrequent. Those operations with low turnover rates will tend to pursue a strategy of waiting for the optimal selling times in terms of the basis; those with high turnover rates try to make up with volume for what they lose on dealing margins. Since those in the latter group ship more frequently, they are likely to have more predictable flows. As the year moves into the summer, all elevators, no matter what their strategies, must ship enough to make sure they have ample room for the next harvest. An elevator that could not buy at harvest would be virtually out of business.

Deteriorating Grain:

Deterioration can be a problem in the case of grain stored on the ground or in makeshift facilities that lack temperature and humidity control devices. It can occur, for example, in the case of corn stored, uncovered, on a concrete pad; it will be safe through the winter but quality may fall off rapidly when warm weather comes. If this happens before it reaches the processor or the feeder, the value of the corn will be sharply reduced. To avoid this loss, the elevator has to be able to ship grain from such storage by late winter or early spring when demand for grain cars may still be at a seasonal high.

Penalties:

As already noted, most grain sales from elevators are on the basis of seller's equipment: the seller must load the grain in a specified time period or pay a penalty. Typically, the period is defined as the first or last half of some month, but the time specifications may be tighter. Some contracts are by thirds of the month—first to the tenth, 11th to the 20th, 21st to the end; some contracts, particularly for sale to processors, may specify a week—e.g., the second week in May. At the other end of the scale, there may be "whole-month" contracts under which the grain may be loaded[7] any time in a calendar month.

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[7]The seller does not actually comply with the contract until he has executed a bill of lading specifying the type of grain, the amount, the origin, and the destination. The seller does not learn the destination until after the shipment has been inspected; ordinarily, this process is not completed until the day after the cars are loaded. In the trade, people speak of "billing the cars" or "billing a train."

Penalties for default are fixed according to the grain trade rules of the National Grain and Feed Association (NGFA). The basic principle is that the defaulting party must compensate the other party for any costs stemming from the default. If a seller fails to load a train on time, the buyer may go into the market and buy the same type, quality, and quantity of grain from another source for the same time period. If, for example, the buyer has to pay three cents a bushel more than what he would have paid the defaulting seller, the seller must pay the buyer three cents a bushel to make it up. Or the seller may go into the market himself to buy the grain for delivery to the buyer. Not infrequently, a buyer will release the seller from the penalty, if the grain is not too late for his purpose or if there are widespread problems with shippers. The buyer may also want to maintain good relations with a valued supplier.

From time to time, sellers are caught out by a car shortage and have to pay penalties. Severe penalties are, however, infrequent. Penalties, in and of themselves, are not a source of major damage, in large part because people take care not to be liable for stringent penalties. Elevators try to avoid entering into contracts they cannot fulfil, and, in large measure, they succeed. A greater cost is that of being unable to take advantage of market opportunities as they arise.

Missed Opportunities:

We have seen that some elevators move grain out in a relatively steady flow, while others wait for the time when they judge they can realize the maximum gain from the basis. If the basis narrows gradually, different managers may make that decision at different times. When an export sale causes a sudden, sharp improvement in the basis, those managers are more likely to make that judgment at the same time. When that happens, the demand for grain cars will surge, and elevators will have difficulty getting cars when they want them. An elevator that cannot ship may miss its maximum margin for the year.

There is, of course, a close linkage between car shortage and the strength of cash bids at such times. The high bids for grain reflect both an increased demand for grain and an increased demand for grain movement; in other words, the demand is for delivered grain: at export terminals, at feedlots, and at processing plants. Both grain and movement capacity are required to meet this demand. The high cash bids that occur at a peak-demand time reflect, in part, the fact that the volume of grain moving is getting close to the system's capacity limits. If, in some way, more cars suddenly became available at such a time, more grain could be delivered and those high cash bids would come down. Part of the margin, possibly a large part, that some elevators may miss for lack of cars would, therefore, disappear, if all the elevators that wanted to sell were able to get cars at that time.

In any event, elevators faced with this problem either find a way to get cars or forgo the opportunity of the moment and accept the possibility of a lower margin on a later sale. Even if they do get cars, they may have to give up some of the margin in any event—any

market participant, other than a railroad, that has cars available will demand, and get, a premium price under such conditions.

On the basis of our interviews, it is clear that missed trading opportunities are the most frequent source of damage from car-supply problems, in an elevator's perception, and the dominant concern of elevator managers as they deal with car supply. The other potential threats influence the conduct of elevators' business, but appear not actually to materialize as often.

Elevators' Response to Peak-demand Conditions

Well-managed elevators take car supply into account as they plan their operations; in recent years, car supply has been a problem of late fall, winter and early spring. The options open to them for getting cars when supply is tight will vary according to the railroads the elevator is located on. It is useful to think of market options and non-market options. Elevators on BN or Soo territory may make forward provision for cars by buying COTs or PERX. If they have not provided themselves with COTs ahead of time, they may enter the secondary market and buy COTs when they want to ship (at this time, there is no secondary market in PERX). They may also buy guaranteed cars in railroad carpools, such as those operated by BN, UP, or Santa Fe.

An elevator may try to get leased cars on a short-term basis. (In the 1970s, a number of elevators held cars on long-term leases; in the car-surplus period of the 1980s, these leases proved to be crushing burdens.) Whether the short-term lease option is open on BN territory will depend on the conditions prevailing there. Or an elevator may seek to sell to a merchandiser who, one way or another, has cars available. Explicitly or not, the merchandiser's bid to the elevator is likely to reflect a premium to the merchandiser for his control of cars in a time of scarcity. (Because of the size and scope of its operations, a merchandiser will have more options for obtaining cars than an elevator will.)

We have already noted that, in varying degrees, many railroads give weight to advance ordering of cars. This is a major non-market option and many elevators will try to take advantage of it. Once in a peak-demand period, many shippers will try to manipulate a railroad's allocation system. Elevators will watch a railroad's car allocation decisions to see if they can discern a pattern and then try to use that information to "game" the railroad's allocations. For example, if an elevator thinks a railroad is setting priorities according to the time cars are wanted (the "want date") and the railroad is running four weeks behind, the elevator will order cars for four weeks ahead of its true want date. Or, very commonly, if an elevator thinks the railroad is giving customers some percentage of the cars they order, it will order more cars than it wants. Sometimes, an elevator will order cars without a specific sale in mind, but in the belief that it will be able to arrange a sale on good terms if the cars should turn up (in a period of tight car supply, this belief is likely to be justified).

For some elevators, truck shipment may be a viable option when they are having car-supply problems. The length of haul that may be feasible varies with regions (and, of course, with market conditions). A Kansas elevator manager suggested that a truck move from Wichita to Kansas City, roughly 180 miles, would be a viable haul under car-supply pressure, but that it was probably an outer limit. North Dakota and Minnesota grain marketing people stated that a truck move from the country around Fargo to Duluth or Minneapolis, some 240 miles, was a feasible option when they could not get cars. It must be made clear, however, that in neither the North Dakota case nor the Kansas case were people saying that these long truck hauls were desirable options when compared with rail shipment. They were saying that, given strong bids and car-supply problems, these were *acceptable* options. Hauls of greater length would be unlikely to be feasible. Sometimes a car shortage will cause truck shipment between elevators on different railroads when the elevator on one carrier can get cars and the other cannot.

The ability of a country elevator to manage car-supply problems effectively depends on information and expertise; these factors are, in large measure, a function of the size of an elevator's business. Above some size, an elevator can afford to hire a person, usually called the marketing manager, whose full-time work is watching and analyzing grain and transportation markets. Elevators with this kind of staff expertise will be alert to current trends and prepared to devise responses to logistical and market problems as they arise. One cannot be rigid about the minimum scale that justifies hiring a marketing manager. It would obviously vary with a variety of conditions, but there is some reason to believe it is in the vicinity of five or six million bushels a year. Whatever the exact number may be, it is an important factor affecting an elevator's behavior. Some elevators too small to hire a marketing manager will use the services of a consultant to obtain this kind of support. Some merchandisers will assist smaller elevators with car-supply problems, possibly for a moderate fee but largely as a means of holding the loyalty of these elevators. Small elevators on BN territory, for example, may rely on a merchandiser with whom they have close relations to supply them with COTs or guaranteed cars or to act as a broker in the secondary markets for COTs or guaranteed cars.

Marketing managers will continually try to anticipate car problems and plan their business to minimize or avoid damage. The difficulty of their task and the exact tactics they employ vary with the operating practices of the rail carrier or carriers they work with. Every elevator manager interviewed who worked with railroads without formal allocation schemes (i.e., all except those on BN, Soo, or UP territory) believed it was useful to keep the railroads informed of their plans and their business situation and to place car orders as far ahead as possible. This is easier for those elevators with high turnover ratios, whose shipping patterns are relatively predictable.

It is no exaggeration at all to say that an elevator that made no advance provision of any kind for car supply, waited until it was certain of the day it wanted cars, and then ordered them through conventional tariff procedures might not survive a single winter. For example, during the winter of 1992–93, the BN, in some of its territory, was two months or

more late in the placement of trains or cars ordered under its conventional tariff procedure.[8] An elevator that did nothing but wait for such cars to appear would suffer serious damage and could easily go out of business. On the other hand, it is doubtful that very many elevators choose this path; other options are available, albeit at some price.

Merchandisers and Exporters

Normal Mode of Operation

The merchandiser's principal role in the market is as the intermediary between the elevators and the end-users, domestic or foreign. The merchandiser is a trader who, like the elevator, gets his income by selling grain for more than he pays for it. Both are market intermediaries but, beyond that, there are major differences in their modes of operation. A merchandiser buys grain from anyone who is willing to sell at a price he finds attractive. He may buy from elevators, from other merchandisers, or from farmers. He sells to feeders, processors, other merchandisers, or overseas buyers.

In part, a merchandiser conducts his business in a manner similar to an elevator. If he perceives sufficient carry in the market, he will buy cash grain, hedge it, and watch the basis and the spreads until he thinks the time to sell has come. The merchandiser also carries on a short-term trading operation that is unlike anything the elevator does. In these operations, the merchandiser often does not hold grain for much longer than it takes to deliver it and frequently has sold it before he buys it. He hedges some of these positions, but not all of them. Unlike most elevators, the merchandiser will carry open positions, long or short, as he believes market conditions warrant. When working as a trader, the merchandiser seeks to exploit short-term opportunities in the market as they arise. If he finds a buyer willing to pay a slight premium over the market, the merchandiser will sell to him in the belief that he can buy the grain at a price that will give him a profit. Similarly, if he finds a seller willing to take a price a little below the market, or a little below what the merchandiser thinks the market will be in a few days, he will buy.

Unexpected movements in supply and demand, even small movements, are a major source of the merchandiser's income. He follows the market in a much more detailed, intimate way than does the marketing manager at an elevator. The manager at the elevator will call bidders once a day, perhaps twice, to gauge the cash market and will keep an eye on various computer bulletin boards to get additional information on the cash market. A merchandising firm will typically employ at least several traders, perhaps dozens, who spend the whole of the working day with telephone and computer probing the market for opportunities and exploiting them when found.

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[8]We are not in a position to offer a complete explanation of this phenomenon. We do note that there were record exports of spring wheat out of the Dakotas in that winter and that the weather was severe; undoubtedly there are other factors that contributed to this situation.

A number of merchandisers are cooperatives, owned by groups of elevators. Merchandisers are much larger operations than elevators. A big elevator cooperative will handle a little more than 30 million bushels a years. A middle-sized merchandiser may handle hundreds of millions of bushels. The scope of a merchandiser's business is much wider than an elevator's, both in a geographic sense and in the sense of handling more kinds of grain than any one elevator operation will. Another way of putting this is that the merchandiser works in a wider set of markets; this is a significant difference with respect to car-supply problems. The wider scope of operation provides a range of opportunities for the use of grain cars at any given time. This fact reduces the risk to the merchandiser, especially the larger one, when he makes commitments to secure future car supply. Such commitments carry the risk of having more cars available than can profitably be employed; losses could be substantial. The more opportunities available to a merchandiser for using cars—the more regions and markets he operates in—the lower the likelihood of loss.

Exporters are merchandisers whose business includes selling to overseas buyers. In principle, selling to foreigners is no different from selling to any of the other entities that purchase grain. Merchandisers look for buyers and hope to accommodate them at a profit. In important ways, however, exporting is a highly specialized activity; it requires facilities and functions not needed for selling to domestic customers. The exporter has to arrange documentation for the sale, not a small task, secure and pay for the ocean transportation, and make sure that he gets paid for the grain. He may have to assist the buyer in securing credit. Most export transactions are short sales; the merchandiser first concludes a sales contract with a foreign buyer, then buys the grain, arranges the domestic move to the port, and arranges ocean shipment. Overseas shipment of grain requires an export elevator, essentially a transloading facility at dockside for transferring the grain to ocean bottoms (ships).

The number of firms that own such export facilities is small. Archer Daniels Midland, Cargill, Conagra, Continental, Bunge, and Louis Dreyfus, together with a few Japanese firms and an Italian one, own the great preponderance of export terminal capacity, particularly the modern, efficient facilities. Grain industry observers agree that, at this time, there is substantial excess capacity in export elevators. All of these companies operate on a worldwide basis, finding customers wherever they can and buying grain wherever they find the most economical source.

Almost invariably, the importer is a governmental body. This can mean the importer is driven by non-market considerations in timing its buying decisions. At one time, this was certainly true; importers tended to buy in very large amounts, perhaps supplies for a year or more in one transaction. There is now a trend toward buying grain on an as-needed basis; some importers, quite rationally, want to avoid the costs of holding large quantities of grain including the cost of making postponable hard-currency expenditures. These buyers are, in short, seeking to realize the gains of just-in-time inventory management. Along with reducing quantities purchased in any one transaction, they are also requiring quicker delivery. For example, contracts may call for delivery 30 days from the date of sale.

Peak Demand: Risks and Opportunities for Merchandisers

Merchandisers, just like elevators, pay constant attention to car-supply conditions. They can be hurt by failing to carry out a contract or having to forgo trading opportunities. Exporters, in addition, will have to pay ocean demurrage if they cannot load a ship on time. Choosing between a high risk of default and giving up a promising opportunity is a decision that a merchandiser would rather not face. The merchandiser must either make forward arrangements for cars or try to find a way to obtain cars on short notice. In practice, merchandisers do some of each.

Forward arrangements for cars may take the form of agreements with railroads that give a merchandiser control of a given number of trains (as with the CNW cycle trains) or leases, COTs, and PERX. Leases (including cars placed in carpools) and COTs are tradeable claims on railcars. Buying these claims amounts to taking a speculative long position in railcars. When demand is high for grain cars (and, as in the short run, car supply is fixed), premiums will accrue to those who hold these claims.[9] Cash bids for grain will reflect the demand for cars as well as the demand for grain. If a trader who holds claims on cars buys grain from a seller who is uncertain of car supply, that trader's bid will pass on little, if any, of the premium accruing to cars (in other words, if that trader did not have cars, he would have to offer a higher price). If the seller faces a zero probability of getting cars on his own, all the premium will stay with the buyer who holds cars. If the seller controls cars and the buyer does not, then the premium will go to the seller.

In slack-demand periods these premiums on cars will vanish, and a holder of cars may have to offer premiums for grain in order to have a use for his cars. Whether the holder of a lease that runs for a year or more makes or loses money depends, of course, on the net of his gains in high-demand times against his losses in car-surplus periods.

It would be a mistake to think of merchandisers as being divided, in car-shortage times, into two groups: those who hold claims on cars and those who are forced to buy them. Those who hold claims are likely also to be buyers in the short-term market. Indeed, the same trader may be selling cars in one region and buying them in another. Arbitrage occurs in car trading just as it does in grain trading. Many merchandisers will not try to provide themselves in advance with enough cars for all likely opportunities; they stated that they prefer to err on the side of too few cars rather than too many. In the early and middle 1980s, many merchandisers suffered major financial damage from holding too many leased cars. Some merchandisers follow a strategy of using their own cars in their most profitable markets and relying on short-term measures for marginal opportunities. A number of merchandisers will want to have cars

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[9]Because of relatively inflexible rail rates, these premiums will tend not to accrue to railroads. The BN may capture some through COTs, but there are close observers of the COTs market who believe that the BN, in fact, receives only a small share of these premiums.

available, not just for their immediate trading profits, but in order to assist, and hold the loyalty of, elevators they rely on for grain supply.

In a high-demand period, the merchandiser who is best able to protect himself from damage and find profitable opportunities is the one who has the widest range of options in terms of transportation and of sources of grain. Grain-trading people will often speak of a firm's "deck"—the number of rail cars and barges controlled and the amount of grain owned, in storage, or in transit. The larger a firm's deck, the wider its options, and the better it will fare in a time of car shortage. An exporter, for example, may willingly pay demurrage on a substantial number of cars at an export elevator in order to avoid the risk of not being able to load a ship. It is, of course, possible to have too large a deck. As already noted, the trader who provides himself with too much transportation faces the risk of being unable to recover the costs of the cars he holds. Dealing with this question requires merchandisers to make risk calculations with regard to grain cars akin to those they make about buying and selling grain.

Processors and Feeders

In the context of car-supply problems, the salient characteristic of both processors and feeders is that they require a steady, assured flow of inbound grain. To shut down a processing facility, other than for scheduled maintenance (typically, a yearly event) is very costly. Animals must be fed every day. Neither processors nor feeders have significant storage facilities; if grain is not delivered on schedule they face the prospect of serious losses.

Processors and feeders will buy first from local suppliers, then reach out to more distant sources as nearby supplies are exhausted, thereby holding transportation costs to a minimum. Like other grain market participants, processors and feeders watch market conditions carefully so they can anticipate car-supply problems. One of their principal responses to car shortage will be to buy grain beyond their immediate requirements in order to keep a full inbound "pipeline" of grain and, if necessary, have more grain than needed in cars on their tracks or on constructive placement[10] if their track is full. Given the magnitude of the costs they face if they run short of grain, rail demurrage charges are a comparatively inexpensive insurance payment.

Many processors and feeders are large receivers. As discussed previously, some railroads will find it advantageous to dedicate an agreed-upon number of unit trains to the use of a single receiver. This practice appears to be fairly common both in the Midwest and the Southeast (where many feeders and processors are located).

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[10]"Constructive placement" occurs when a railroad delivers cars to either a shipper or receiver and the customer has no track space available for the cars. For the purposes of assessing demurrage charges, the railroad deems the cars to be constructively placed on the day they arrive at the facility in question, although they remain on the railroad's tracks.

SECTION B—RAIL GRAIN-FLOWS AND SYSTEM PERFORMANCE

The material in this section is presented in two parts: *GRAIN FLOWS—DOMESTIC AND EXPORT* and *SYSTEM PERFORMANCE*.

GRAIN FLOWS—DOMESTIC AND EXPORT

Generally speaking, major fluctuations in rail grain shipments are driven by fluctuations in exports. Figure II-1 shows, in the upper curve, total grain car loadings and, in the lower curve, total grain car loadings for export.[11] From 1989 on, peaks in total loadings fairly closely match the export peaks. In 1987 and 1988, this relationship was not as close, particularly in 1987. A major wheat sale to the Soviet Union in the summer of 1987[12] was followed by the release, late in the year, of 700 million bushels of wheat from Commodity Credit Corporation (CCC) storage (with export as the goal).[13] This is a large amount; the 1987/88 U.S. wheat crop was 2.1 billion bushels (and 1.6 billion bushels were exported).[14] It is likely that some of the domestic carloads represent wheat moving to intermediate terminals for consolidation before going to export elevators. Following the CCC release, there would have been repositioning among domestic storage facilities and, thus, more export-related moves showing as domestic loadings. Once we allow for this factor, the general point holds that the major fluctuations in rail grain shipments are export-driven.

Figure II-2 illustrates the same point by comparing domestic car loadings with export loadings; exports clearly fluctuate over a wider range than domestic shipments. The steep drop in domestic loads at the end of each year simply reflects the fact that railroads minimize holiday work for their crews; grain cars are not picked up or delivered during the Christmas and New Year's holidays.[15] Further, it is possible that the pattern of increased domestic loadings in the third quarter partly reflects exports. This would be true to the extent that some

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[11]The curve for export carloads actually represents grain cars released at ports, lagged one week behind the total carloads; i.e., we assume that the cars unloaded at ports in any given week were loaded at interior points in the previous week. While actual transit times from interior points to ports will vary, and will rarely be precisely one week, this assumption gives us a valid comparison between export loads and total loads.

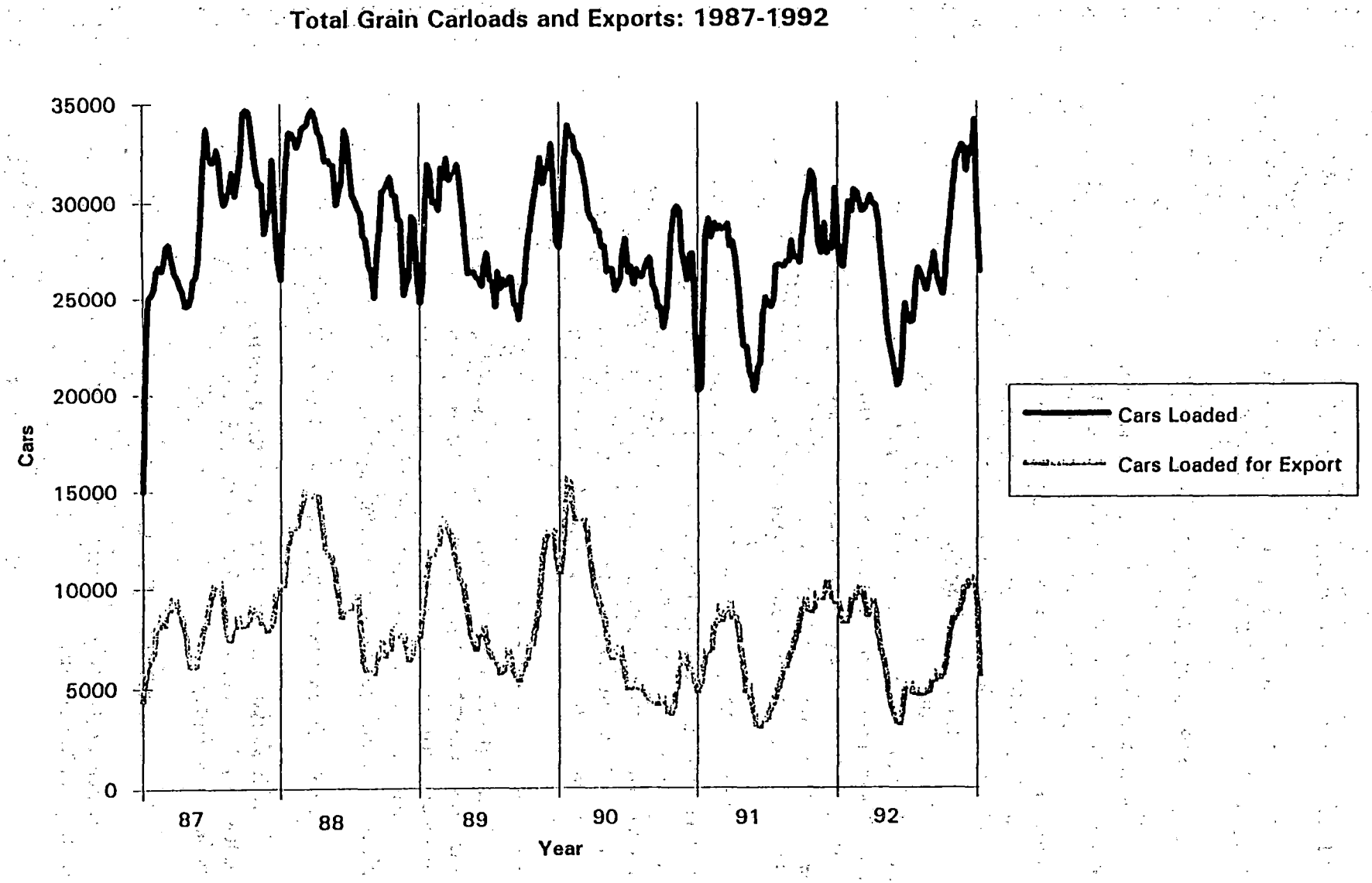
[12]USDA, Foreign Grain Inspection Service (FGIS) and conversations with USDA staff.

[13]Keith Bjerke, Administrator, Agricultural Stabilization and Conservation Service, USDA, verified statement before the ICC, Ex Parte No. 490 Grain Car Supply—Conference of Interested Parties.

[14]USDA, Agricultural Outlook, December 1992.

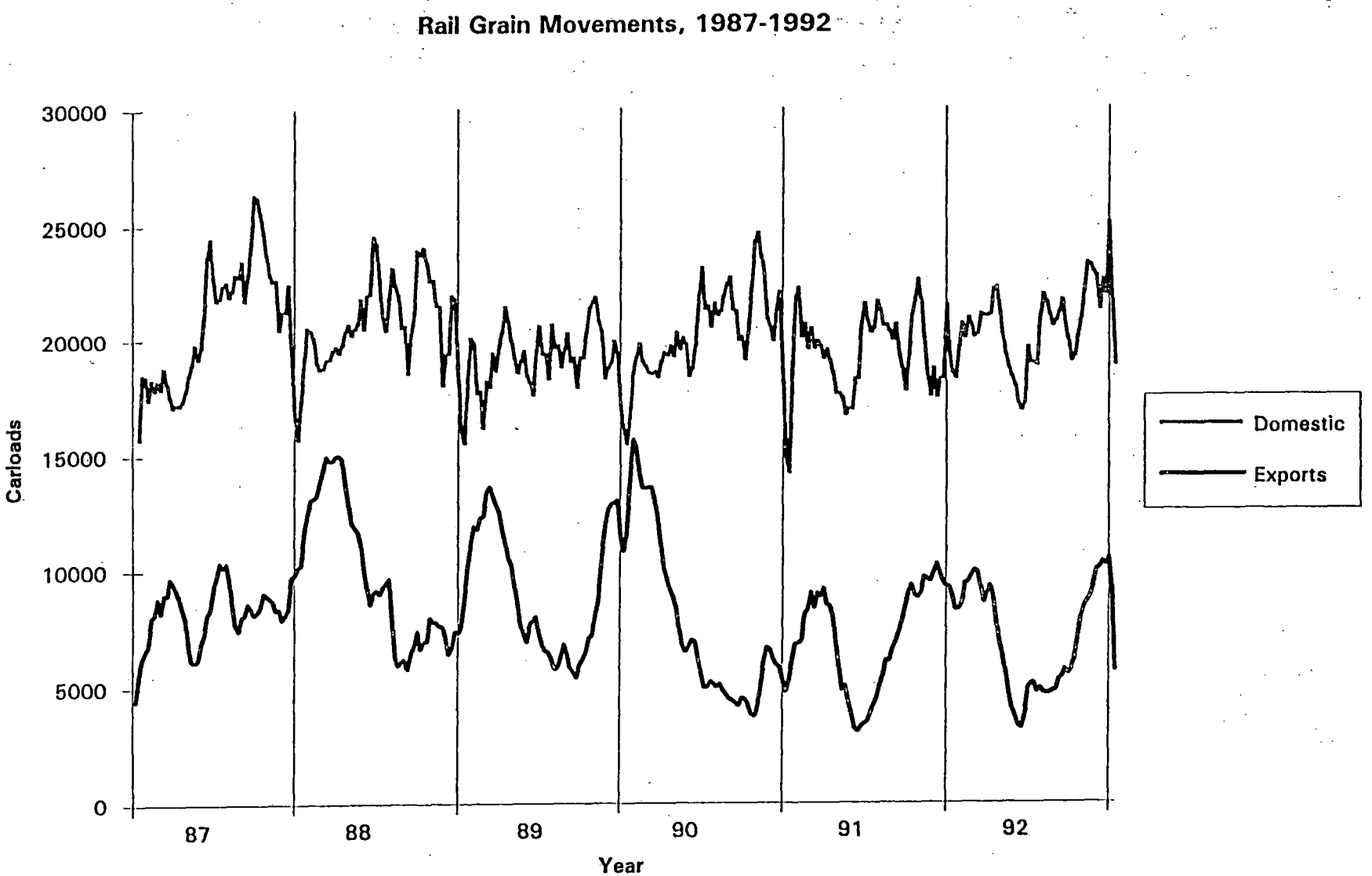
[15]Other drops in the domestic curve are also accounted for by holidays, e.g., the Fourth of July and Labor Day.

Figure II-1



Source: Association of American Railroads

Figure II-2



Source: Association of American Railroads and Grain Transportation, USDA, Office of Transportation

of these loadings are wheat moving to terminals for export later and corn and soybeans moving to river terminals for barge movement to ports.

The export curve shows a clear seasonal pattern: rail shipments are at a high peak in winter and drop off rapidly in late winter or early spring. Further, as Figure II-3 shows, total grain exports reflect a similar pattern of a winter peak followed by a sharp drop in the spring. Export sales are highest in the months after the harvest because that is when U.S. grain prices are likely to be most attractive to world buyers. Cash grain prices in this country will be at their lowest levels in the annual cycle, and they will be at the high levels of the cycle for southern hemisphere producers who are in the period just before harvest. (U.S. winter wheat prices will be at their seasonal lows in the summer when winter wheat is harvested, but movements of winter wheat will rarely tax the system the way the fall harvest does; winter wheat accounts for about 20 percent of all grain exports.[16])

This seasonal aspect of export sales leads to a comparable seasonal pattern in car shortages; they are largely a winter phenomenon. Peak demands fall on the rail system at a time when there are significant aggravating factors. Much of the Mississippi River above the Illinois River (which enters above St. Louis) is closed in the winter[17]; more grain must move by rail and over longer distances. Winter conditions reduce railroad operating efficiency. More power is needed to pull the same tonnage; storms can slow traffic or stop it altogether. Feeders' demand for grain increases in winter since animals require more calories in cold weather.

Both the data reviewed here and discussions with grain traders and railroad people point to the same conclusion: as they look ahead to the next winter, grain-market participants must consider the likelihood of car-supply problems and make their plans accordingly. Periods of peak car-demand are export driven and seasonal; they are predictable with respect to timing, less so with respect to magnitude.

SYSTEM PERFORMANCE

Market participants, industry observers, and the available data are all in agreement that there were significant car shortages in 1987/88 and 1989/90. The only available quantitative index on car shortage, as such, is the data series that was maintained by the Association of

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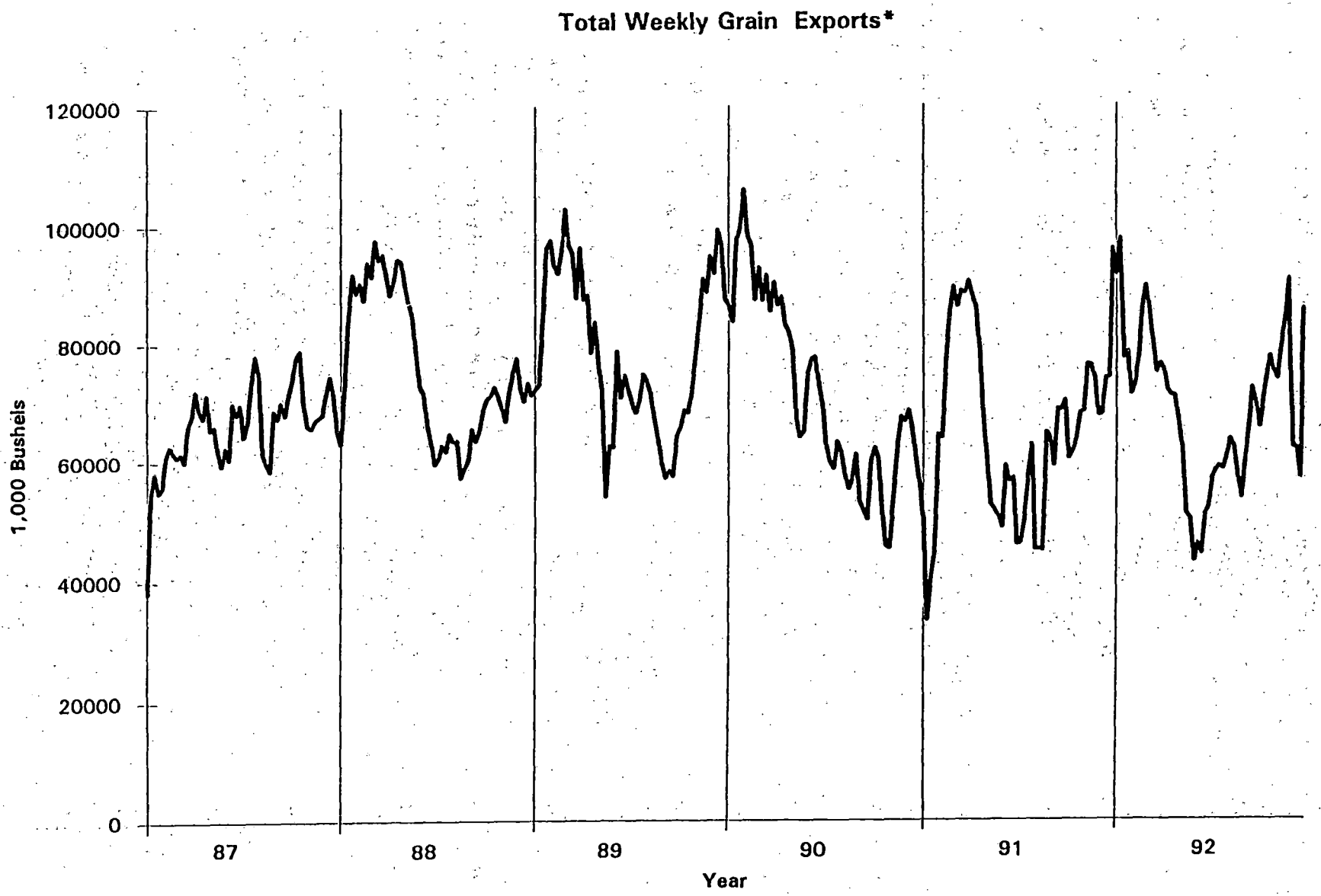
[16]All wheat averages just over 30 percent of grain exports (USDA, Agricultural Outlook, November 1993, Table 17, p. 52); winter wheat, according to industry observers, usually accounts for somewhat more than 60 percent of wheat production.

[17]The stretch of the Mississippi that is actually closed varies with the severity of the winter; it is never closed below Lock 25 at Winfield, Missouri, and it is sometimes open as far up as Lock 19 at Keokuk, Iowa.)

Figure II-3



*Includes wheat, soybean, corn, and sorghum through Gulf, Atlantic, and Pacific ports

Source: Grain and Feed Market News, USDA, Agricultural Marketing Service

American Railroads (AAR) until the end of 1991. These numbers, for 1987–91, are reflected in the graph in Figure II-4.

This index is based on the difference, for any given day, between cars ordered for placement on that day and cars actually delivered that day.[18] Unfilled orders from previous days are not included in the calculation; the cars delivered on any one day may be cars that were ordered for placement several days or weeks before. This data series, thus, does not measure the backlog of orders either in terms of lags in placement or the number of unfilled orders. It does, however, offer some measure of the relative intensity of demand at different times. In fact, since the rate of car placement is likely to be more stable than the rate of orders in a peak-demand period, this index must be largely a measure of orders.

It has to be noted that there are serious problems with any index that might be used to measure car shortage. Measures commonly discussed are numbers of unfilled car orders or numbers of weeks late railroads are in delivering cars to their customers. As we saw in SECTION A, elevators will resort to excess ordering in a car shortage in an effort to manipulate railroads' allocation decisions. This will inflate the number of car orders; the introduction of cancellation charges has greatly reduced this practice but certainly not eliminated it. An elevator can order cars ahead and cancel just in time (typically two or three weeks before the want date) to avoid the charges. Or some elevators will let the orders stand, confident that, if they get cars, they can sell grain on favorable terms. There are similar problems with number of weeks behind in placing cars. If an elevator manager believes a railroad is three weeks behind, but is trying to allocate by order of want date, he may order cars for three weeks before he really wants them.

Backlog measures, in either time or number of orders, are also clouded by the fact that a number of carriers will stop taking orders when their backlogs, however defined, reach a certain point. The Santa Fe drops all orders at the end of each month, so there can never be a large number of outstanding orders on that system. UP will not let orders for "system" cars (cars not guaranteed through ACOS) carry over from one month to the next; similarly BN, under its new arrangements, drops unfilled orders for tariff trains at the end of each month. Indeed, for UP and BN, which in different ways provide large numbers of their customers with guarantees of car delivery, measures of backlog begin to lose all meaning.

In any event, the curve in Figure II-4 supports the proposition that 1987/88 and 1989/90 were the significant periods of car shortage since 1980. In an interesting way, this point is corroborated by the pattern of total grain carloadings. It is the view of many grain-market participants and observers that cars will be in short supply when weekly loadings

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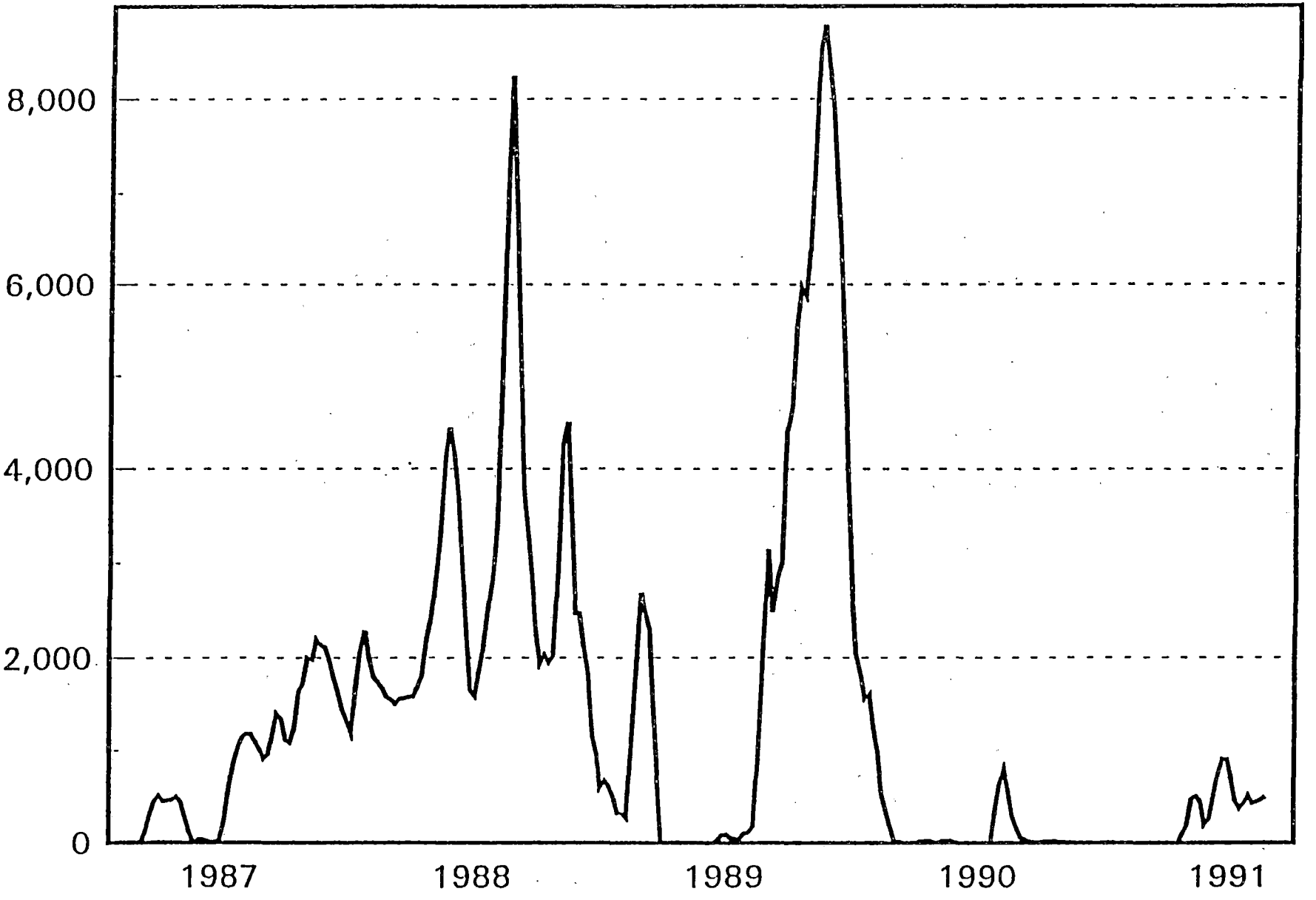
[18]AAR converted railroad data into weekly averages for this purpose; i.e., carriers' Monday-through-Friday totals for the difference between cars ordered for those days and cars placed were divided by five. In Figure II-4 we show three-week moving averages to smooth the curve.

Figure II-4. Excess of Grain Car Orders Over Placements (Three Week Moving Average)



Source: Association of American Railroads

exceed 30,000. The graph in Figure II-5 depicts weekly loadings (three-week moving averages) in excess of 30,000 for the period 1987–91. The correspondence between this curve and the AAR car-shortage curve in Figure II-4 is far from exact; but it is close enough to suggest that either measure could serve as a rough index of relative intensity of car demand. Further, weekly grain carloads rarely, if ever, exceed 35,000. This suggests that the effective limit on what the system can now move varies between 30,000 to 35,000 carloads a week. When demand is in excess of this limit, the railroads cannot accommodate all demand and some shippers have to accept delays.

Nonetheless, despite the fact that some (or many) shippers experience delays (or have to work hard, spend money, and take risks to avoid them), very large amounts of grain are moving at these times. (That, of course, is why the system is strained.) There is, in fact, an element of contradiction in the phrase, "car shortage." The words suggest an impairment in system performance, but this is not the case. Car shortage does mean the system is operating at or near its limit, but, in the absence of breakdowns in the flow (from external or internal causes), it also means the system is operating at maximum throughput.

External factors such as weather or river conditions can affect capacity at any time, but particularly in the winter. Internal factors, e.g., large numbers of cars waiting to be unloaded at export elevators, can pull capacity down, but this has not occurred in the post-1980 era. (This is probably due to the fact that exports have not been large enough to tax port capacity.[19] There may also be some improvement in efficiency of unloading at export elevators.[20]) Railroad officials and grain traders agree that, in the 1970s, there were frequent occasions when cars on constructive placement formed queues hundreds of miles long, backing up from export elevators. Under such conditions, the main track is clogged because it is being used for storage, and a large fraction of the grain-car fleet is idle as it waits to be unloaded. There is general agreement in the industry that congestion on this scale has not occurred since then.

Some corroboration of this point is in numbers of cars on constructive placement on the BN at Pacific Northwest docks.[21] In September 1987, roughly 4,000 cars were on constructive placement on BN track at Pacific Northwest terminals. In October, the number dropped to 1,600 and subsequently has rarely gone much over 1,000, a level the BN considers normal for a high-demand period. Other rail carriers interviewed stated that episodes involving large numbers of cars on constructive placement had not occurred on their territories in the post-1980 period. Thus, exporters' desire to have substantial quantities of grain on hand at ports has not, in this period, engendered any significant reduction in system capacity.

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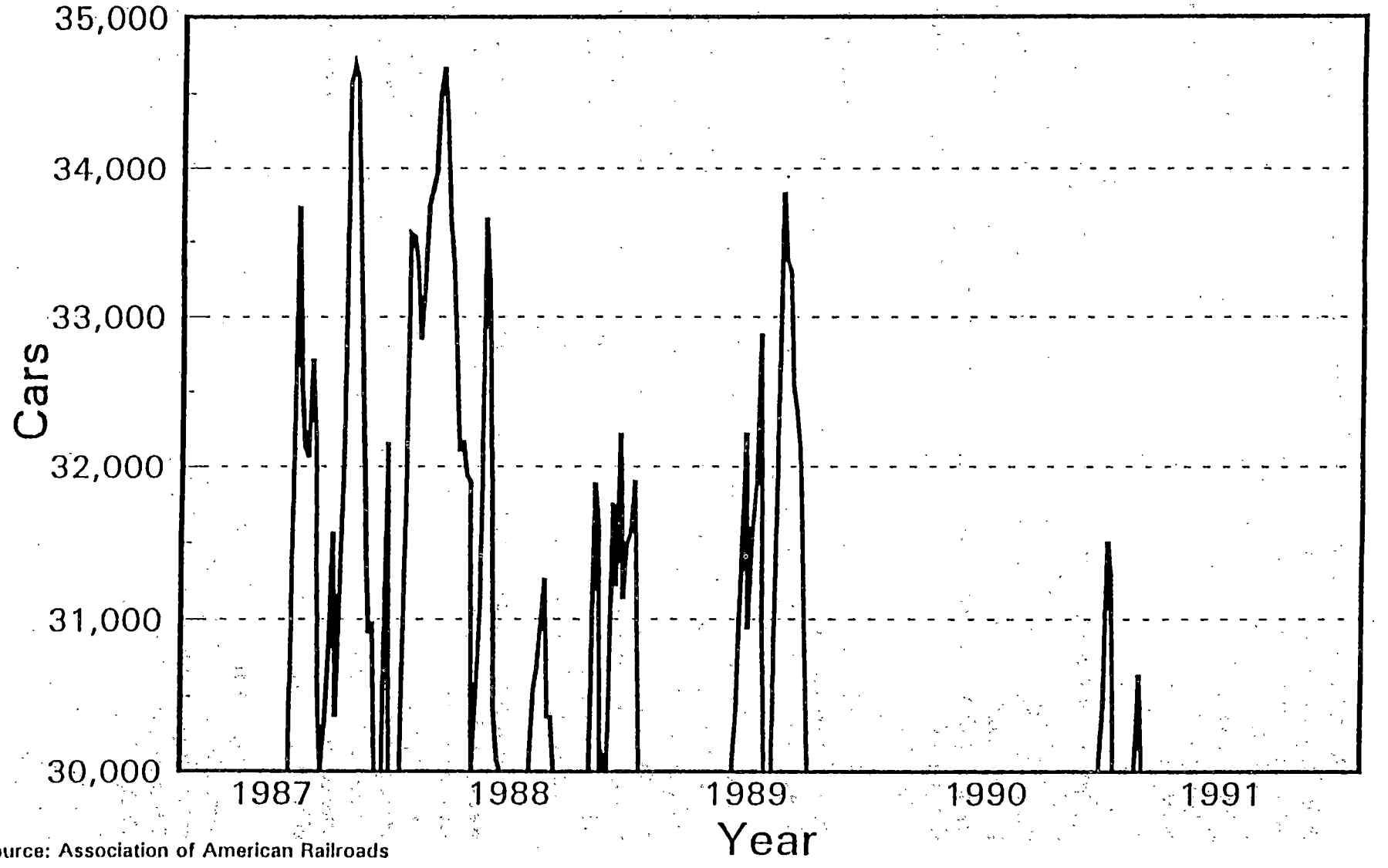
[19]William J. Adams, Tradigrain, Inc., material prepared for National Grain Trade Council meeting, February 1993.

[20]Conversation with BN staff.

[21]Conversation with BN staff.

Figure II-5.
Total Weekly Grain Carloads Over 30,000, 1987-1991
(Three Week Moving Averages)



Source: Association of American Railroads

A similar issue may be raised with regard to excess car orders, i.e., whether such orders lead to railroad operational problems that could limit capacity in a peak-demand time. In the view of several of the major grain carriers (BN, UP, and CNW), excess orders did lead to problems with system operations in recent years. The difficulty arose when a carrier positioned cars for delivery to a facility, or actually placed the cars, only to have the shipper cancel the order. Depending on how quickly the railroad could re-position the cars in question, a significant amount of time could be lost.

These railroads responded to this problem by establishing cancellation charges, the UP and BN in 1988 and the CNW in 1990. The UP and CNW imposed charges of, respectively, $70 and $35 per car and have kept them at that level. The BN initially imposed a fee of $50 per car and has since raised it to $200. Officials of all these carriers state that these charges have substantially eliminated excess orders as an operating problem for the railroad. This is not to say that excess orders have disappeared; but shippers must now either cancel orders in a timely fashion or bear a financial risk if they choose to let orders stand while being unsure of whether they will use the cars.

There is some variation among railroads in the details concerning the way in which these charges are imposed, but the CNW's requirements will serve as a useful example. A shipper who has ordered a unit train under CNW's tariff must cancel two weeks before the date for which the cars are requested to be sure of escaping the penalty. (The shipper will also be free of penalty if the CNW is over a week late with the train in question.) Thus, as the two-week advance date approaches, an elevator must balance two different risks. Given that it is a period of tight car supply, the elevator is not certain that the train will arrive on the requested date. Thus, if the elevator makes a commitment to load grain, relying on that train, it takes the risk of a penalty if the train does not come. If the elevator lets the order stand without having sold grain to load in those cars, it runs a risk of not being able to load and having to pay a cancellation charge.

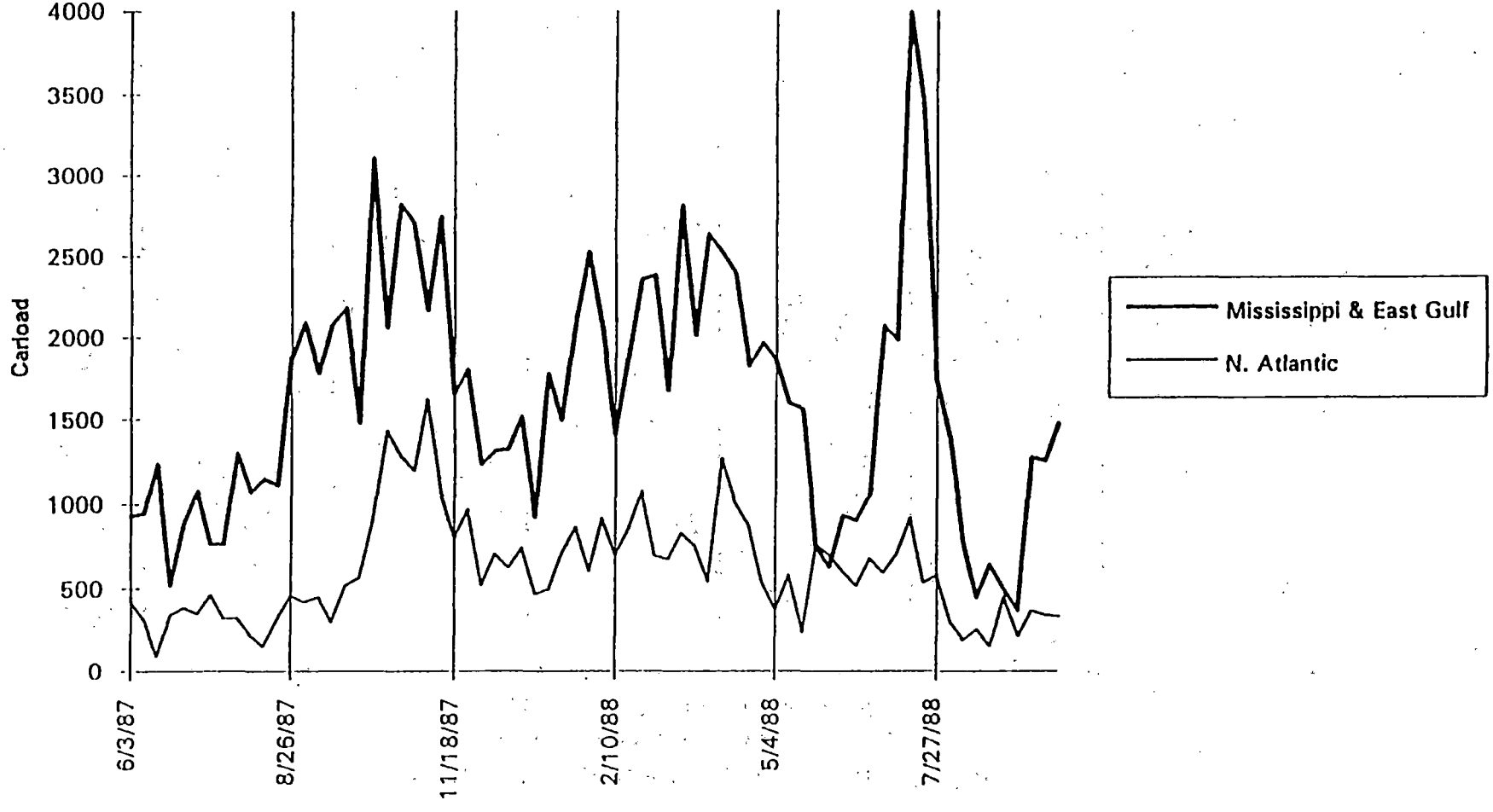
In a peak-demand period, the latter course will often be the more attractive one; the elevator will be confident it can make a sale on short notice, but not confident that the train will come when requested. Nonetheless, elevators are making these decisions in a considered and disciplined manner and paying the penalty if their judgement is proved wrong. As a consequence, extreme inflation of orders has substantially been eliminated as a rail operating problem. In this respect, as with improved efficiency of operations at export elevators, changes in the operating practices of railroads, elevators, and exporters have improved the efficiency of the system.

Figures II-6 and II-7 depict export movements by rail from June 1987 through September 1988. Figure II-6 shows shipments to Texas Gulf and Pacific ports; Figure II-7 shows shipments to Mississippi/East Gulf and Atlantic ports. The two peaks in moves to Texas (summer of 1987 and late fall-winter of 1987-88) reflect major wheat sales spurred by USDA's Export Enhancement Program. In Figure II-7, the peak in movements to the

Figure II-6. Rail Grain Exports by Port Groups
(Three Week Moving Average)
June 1987- September 1988

Source: Association of American Railroads.

Figure II-7. Rail Grain Exports by Port Groups
(Three Week Moving Average)
June 1987 - September 1988



Source: Association of American Railroads.

Mississippi/East Gulf in the fall of 1987 also reflects wheat sales.[22] The other peaks in this curve reflect river conditions; e.g., ice in the winter of 1988, and low water in the Mississippi in July 1988.[23] The same spike stands out clearly in the car-shortage curve in Figure II-4 (it is noteworthy that a phenomenon of this sort is generally referred to as a car shortage—it would never be referred to as a barge shortage).

Figures II-8 and II-9 show rail export moves during the period of the 1989–90 car shortage. The peaks in Mississippi, North Atlantic, and Pacific movements (and especially the first two) all reflect the same major corn sale to the Soviet Union.[24] These movements are also depicted in the very tall spike in the car-shortage curve in Figure II-4, in the total export rail moves in Figure II-1, and in total carloadings. There are some interesting price data that further illustrate and reinforce the relationship between the 1989–90 car-demand peak and market conditions. Figure II-10 shows the effect on the leased-car market. The sharp spike in short-term lease rates and the somewhat less pronounced peak in one-year rates give clear indication of the impact on the railcar market of the export surge.

Figures II-11 and II-12 show the movement of selected barge rates over the 1987–90 period; Figure II-11 displays rates from the Illinois River to the Gulf and Figure II-12 shows rates from the Twin Cities. The breaks in the curve for the Twin Cities reflect the winter closing of the upper Mississippi. This reinforces the point, made earlier, that the river becomes unavailable for export corn shipment just as demand is peaking; one can see in Figure II-11 that Twin Cities rates tend to reach a seasonal peak just before the river closes. When barge traffic on the upper Mississippi halts, a high demand for grain transport is necessarily shifted onto the rail system.

The Illinois River, which does not close in the winter, was once a major source of export corn but less so now. The development of major corn processing facilities in Illinois (at Decatur, Pekin, and Peoria) has diverted much of Illinois corn from the export market.[25] With regard to rate movements, rates from Illinois River points show the same general pattern as Twin Cities rates. Both curves show the same high spike in the summer of 1988 reflecting a brief period of low water and high peaks late in 1989 for the major Soviet corn sale that took place at that time and engendered the 1989–90 car shortage period.

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[22]USDA, Foreign Grain Inspection Service and conversations with staff.

[23]Conversations with industry participants and observers.

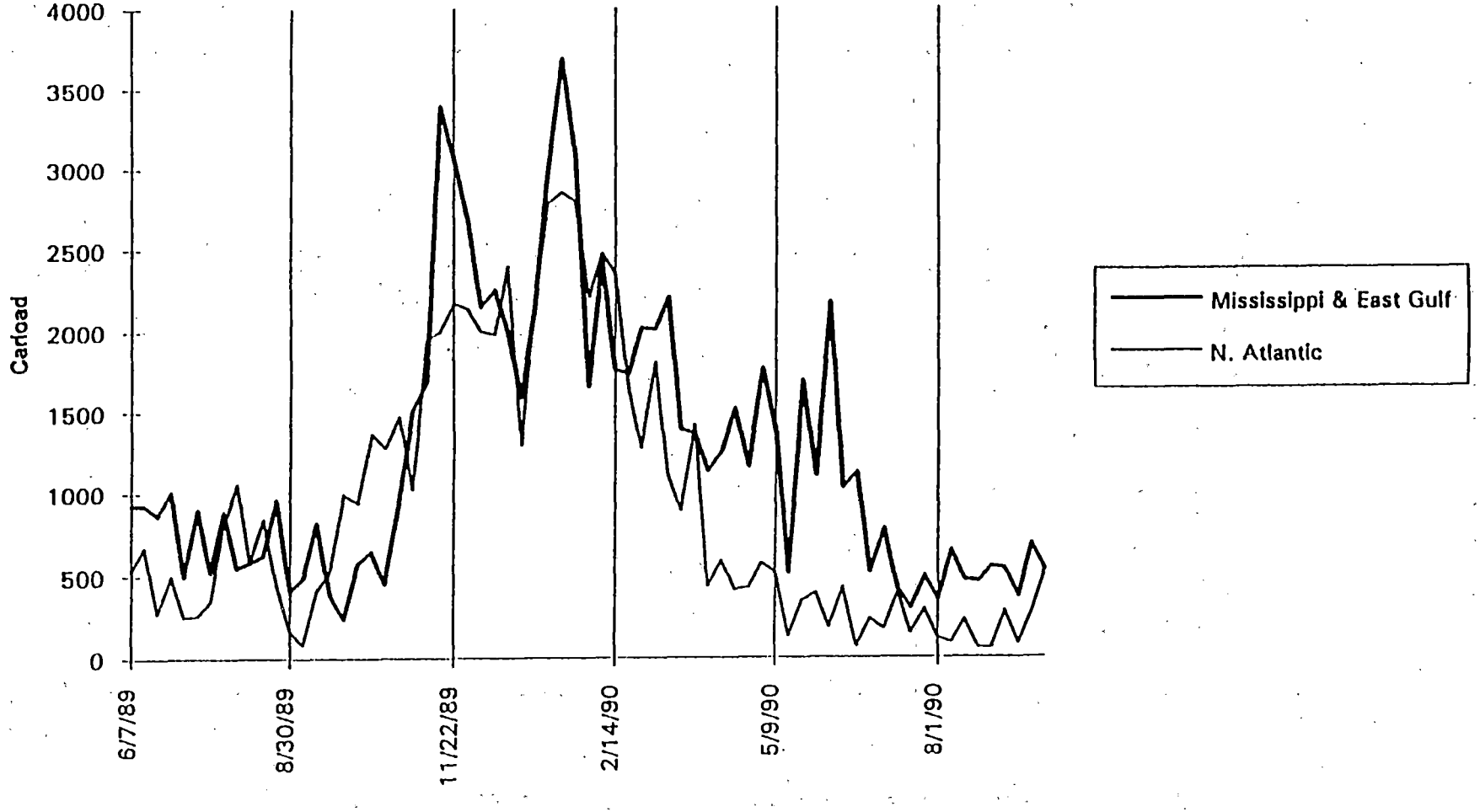
[24]USDA, Foreign Grain Inspection Service, conversations with USDA staff, and with other industry observers.

[25]C. Phillip Baumel and Jerry Van Der Kamp, *Growth in Processing to Impact Corn Production and Handling*, Iowa Farm Bureau Spokesman, Volume 58, Number 21, February 8, 1992.

Figure II-8. Rail Grain Exports by Port Groups
(Three Week Moving Average)
June 1989-September 1990

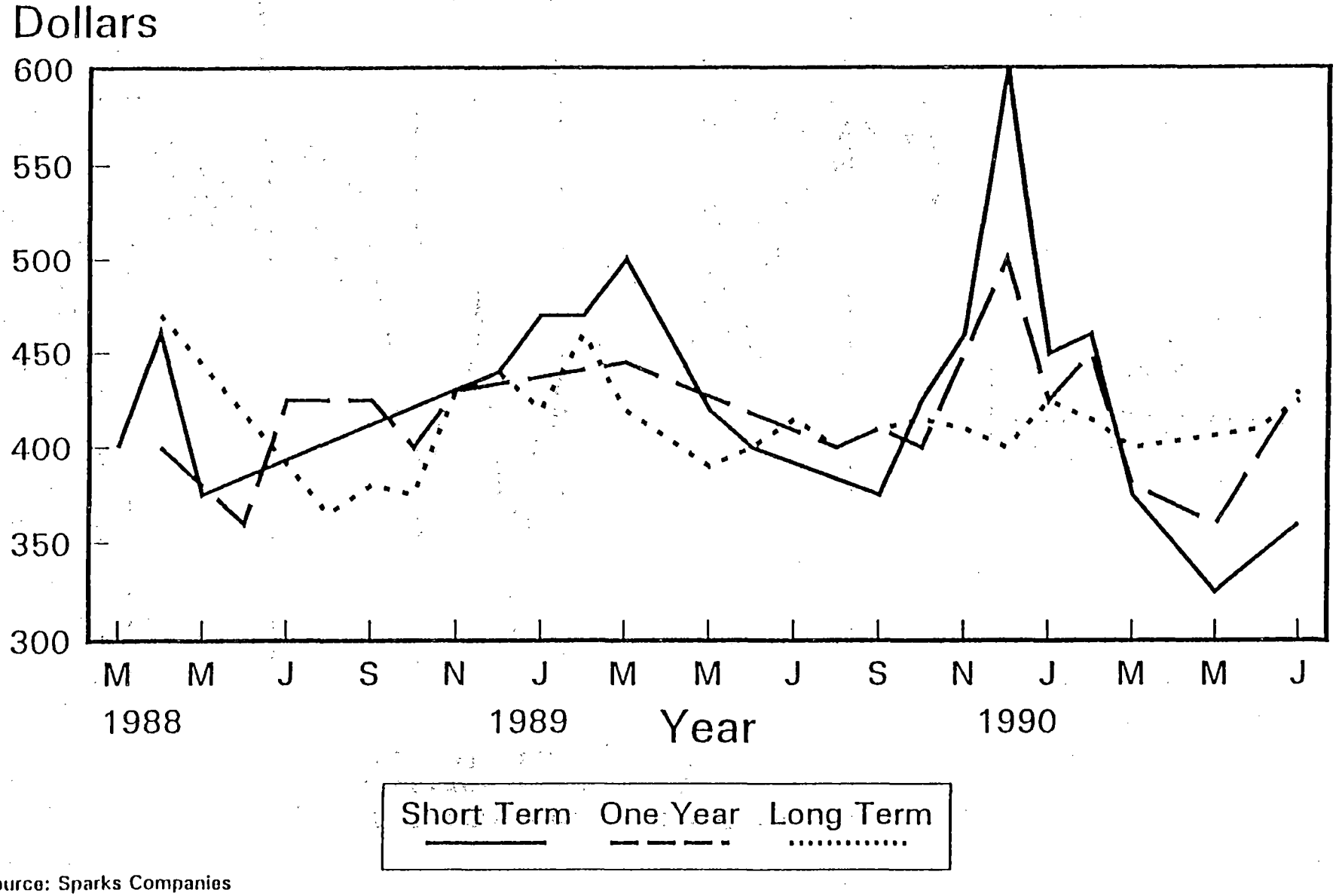
Source: Association of American Railroads.

Figure II-9. Rail Grain Exports by Port Groups
(Three Week Moving Average)
June 1989 - September 1990



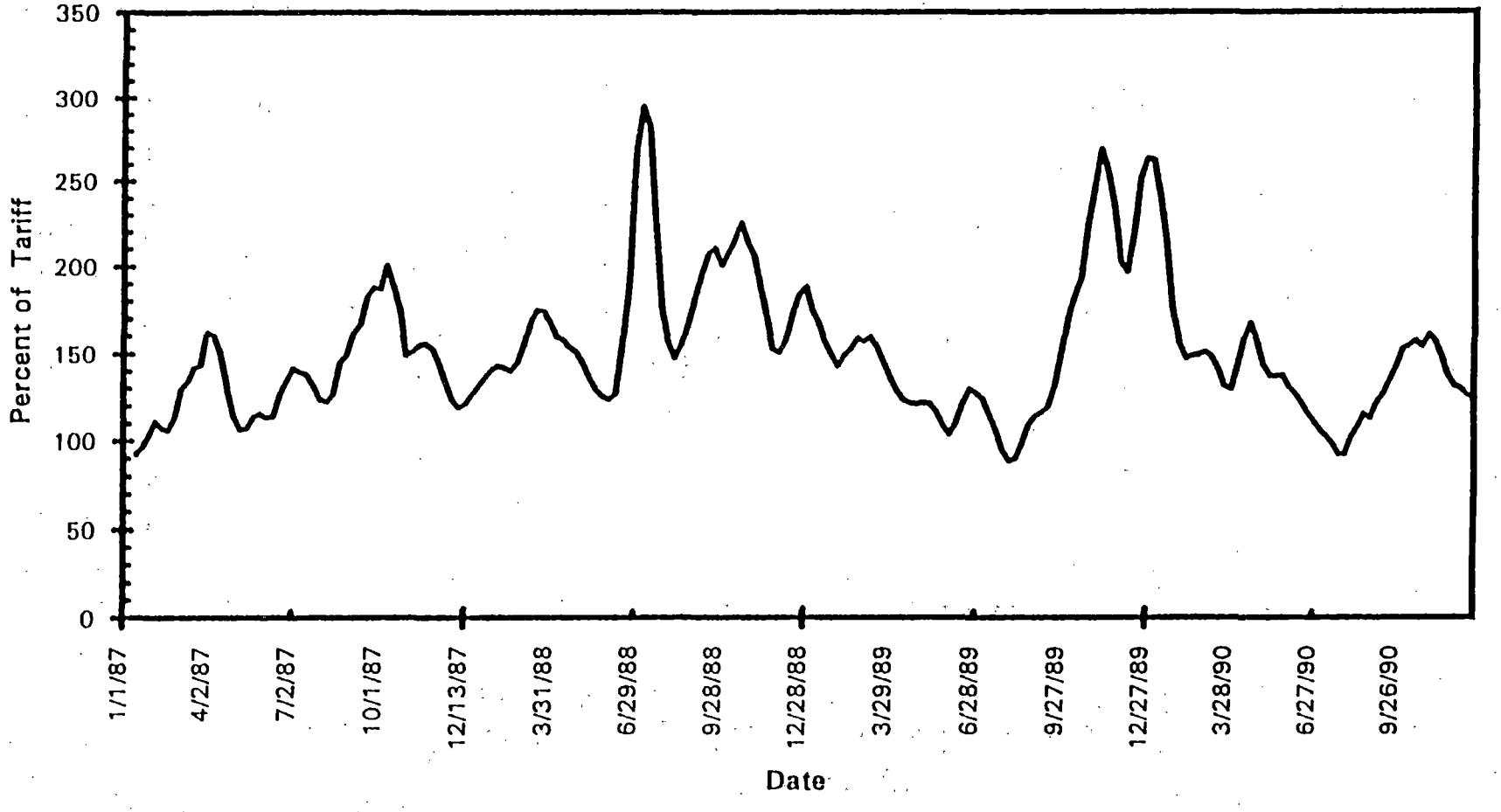
Source: Association of American Railroads

Figure II-10.
Grain Hopper Car Monthly Lease Rates



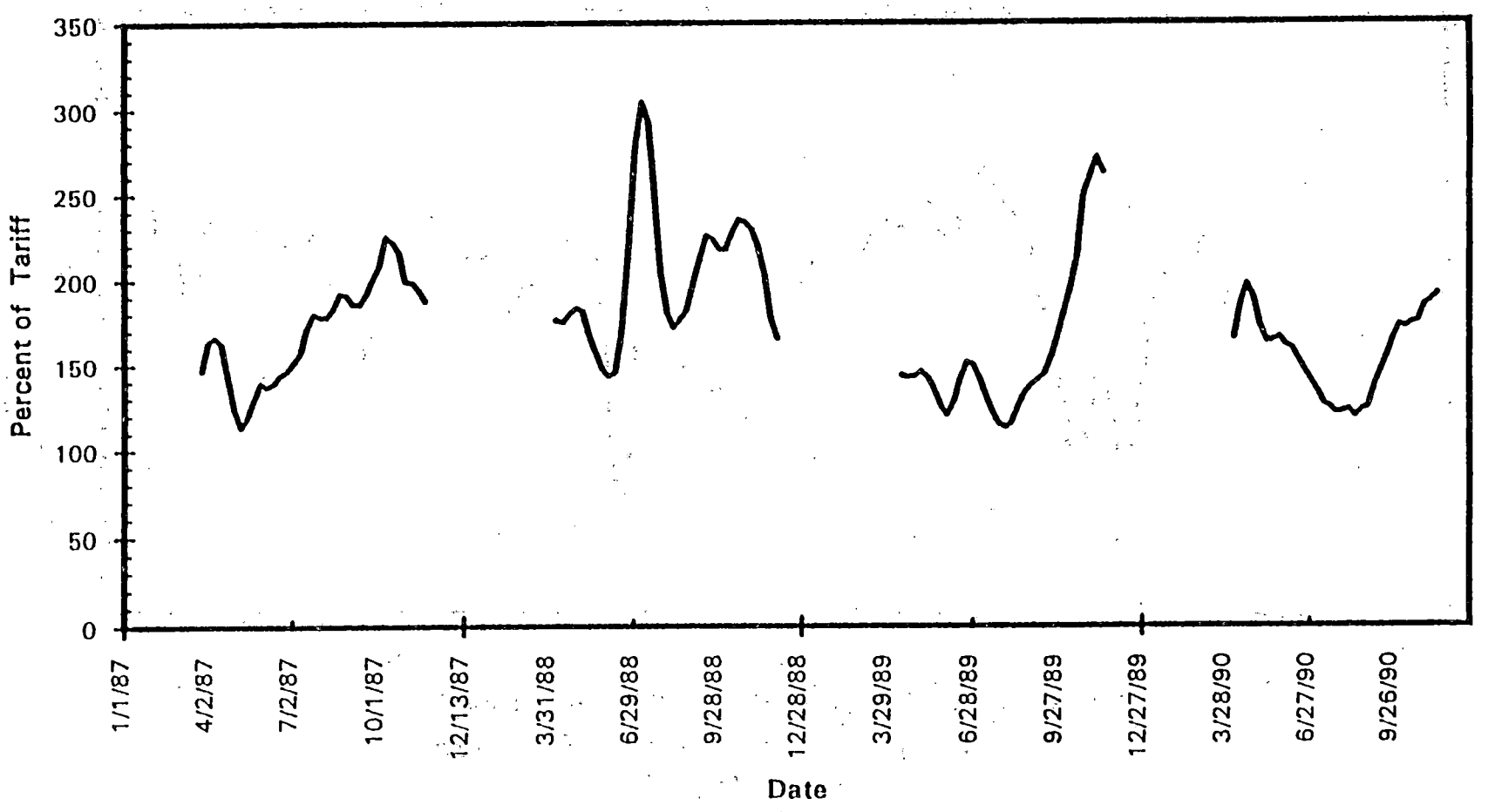
Source: Sparks Companies

Figure II-11
Weekly Barge Rates - Illinois River to the Gulf
(Jan 87 to Dec 90 - 3 week moving average)



Source: St. Louis Merchants Exchange

Figure II-12
Weekly Barge Rates - Twin Cities to the Gulf
(Jan 87 to Dec 90 - 3 week moving average)



Note: Discontinuities in curve reflect periods when river is closed.
Source: St. Louis Merchants Exchange

On the other side of the market, Figure II-13 shows the movement of the corn basis in this period from the viewpoint of western Iowa. The curve depicts the basis with respect to the July contract on the Chicago market.[26] The rapid narrowing of the basis in October, November, and December of 1989 sent a very strong signal to traders to sell grain and the precipitous drop in late December and January sent an equally strong signal that the export-demand surge was gone. In December, very large numbers of elevator managers and merchandisers reached for their telephones to sell corn for January loading and those who were not sure of cars scrambled to find them. The curve for 1987–88 shows similar characteristics, and significant car-shortage episodes occurred in both these periods.

Those that had, or could find, cars were able to sell at an excellent trading margin, less whatever they might have had to pay to get cars. Those that could not get cars missed the opportunity. This distribution of opportunity is, indeed, the heart of the problem and will be discussed more fully in the next section. What is important for the immediate discussion is that the corn was, in fact, shipped to the Soviet Union; the car shortage did not keep it from moving.

More generally, the car-shortage episodes of the post-1980 period do not appear to have caused a failure of the system to move the volumes of grain demanded by feeders, processors, and exporters. This statement is not readily supportable with numerical data. One can use available numbers to make the case that large quantities of grain moved; it is a different matter to prove that all buyers got what they wanted. Nonetheless, the available information lends strong support to this proposition. If there had been significant instances in which processors or feeders failed to receive the supplies they require, it is reasonable to suppose that sophisticated observers of, and participants in, the grain market would have heard of them. But we did not hear of any such occurrences.[27] That such failures to obtain required grain supplies occur rarely, if at all, and that processors and feeders do not expect such failures is further evidenced by the fact that processors and feeders choose not to invest in the storage facilities that would serve as insurance against such damaging events.

Similarly, with regard to exports, we did not hear of any occasions of a default on an export sale due to lack of grain cars. Some merchandisers do say that they forgo opportunities for additional export sales because of uncertainty of car supply. It is certainly possible that, when the U.S. grain transportation system is operating at capacity, an exporter may find buyers with delivery requirements he cannot meet. And should this be the case, that buyer might obtain his grain from another country, rather than wait until delivery can be made from

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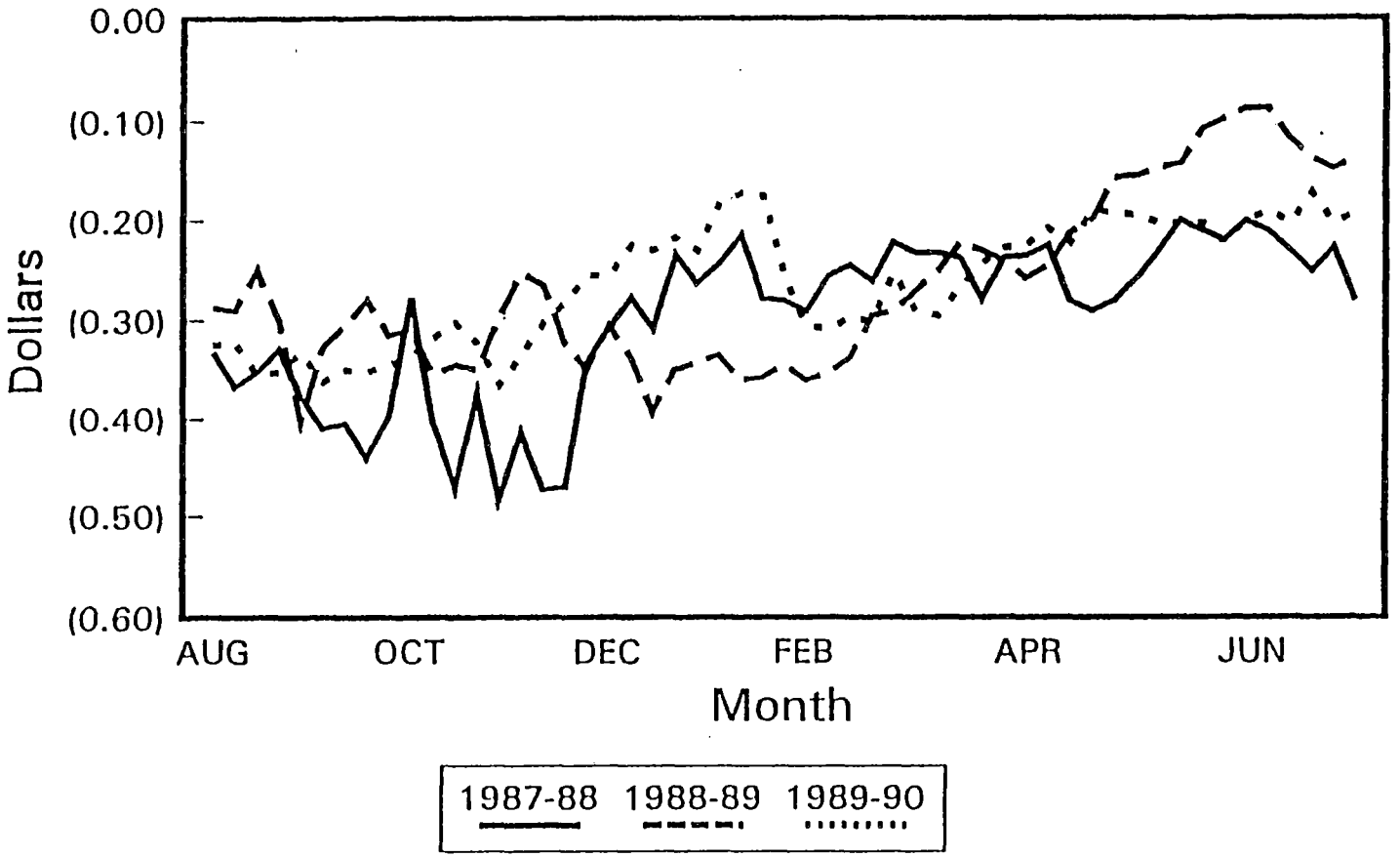
[26]To be exact, the curve is the difference between cash bids (less transportation cost from Ralston) available in Ralston and the July corn contract.

[27]One close observer of grain transportation, a USDA staff member, reported hearing of scattered instances of small poultry feeders in the Southeast being forced to bring grain in by truck over distances where they would otherwise have used rail.

Figure II-13.

Corn Basis -- Ralston, Iowa

Local Cash Bid Less July Futures Contract



Source: West Central Cooperative

the United States. (Whether the buyer makes such a decision will depend on the urgency of his requirements and U.S. prices relative to prices elsewhere.)

Such instances must occur. To what degree they occur, and whether that degree is substantial, is difficult to estimate. It is possible, however, to make some useful observations on this point. One is that U.S. exporters anticipate such problems when they plan their strategies for peak export times. An exporter (like any merchandiser) will try to provide himself with enough cars to meet what he believes are likely requirements. Further, an exporter will tend to maintain a full "pipeline" (a large deck); i.e., keep his port elevators well stocked and keep grain moving toward his port elevators. Of course, exporters may underestimate demand (or they may overestimate it and lose money from buying too much grain car capacity or too much grain). Nonetheless, it seems reasonable to believe that the exporters, collectively, make fairly good judgments in this respect (those that consistently make bad judgments may find it difficult to stay in business).

Exporters will sometimes hold grain in cars on demurrage as part of their effort to maintain a large deck. If they are concerned with a risk of ship demurrage, they find rail demurrage to be an acceptable insurance premium—a merchandiser stated that rail demurrage rates are often one-third to one-half of ocean rates on a per-bushel basis. The fall-off in numbers of cars on constructive placement at Pacific Northwest terminals may suggest some diminution in perception of ocean demurrage risks or default risks on the part of exporters.

A further, and more general, point is that, unless the U.S. grain transportation system had nearly infinite capacity, there would always be the possibility of some export opportunity being lost. This is true, indeed, of many businesses; one can always increase market share by spending more on capacity or by cutting prices—but the question is whether the extra revenue is worth the cost. In sum, while it is certainly true that some export sales may be lost because of limits on the capacity of the U.S. grain transportation system, this does not, in and of itself, lead to the conclusion that transport capacity is not great enough or that system performance is inadequate. Finally, it would be surprising to learn that our competitors in the world grain markets had grain transport systems superior to that in the United States.

SECTION C—SYNTHESIS

In order to understand the fundamental nature of the car-shortage problem, and for whom it is a problem, it is useful to recall some of the key points established in the foregoing discussions:

- Peak-demand periods are export-driven, seasonal, and, therefore, somewhat predictable in timing but less so in magnitude.

- With the exception of BN COTs, Soo Line PERX, and private cars (including cars in carpools), grain cars are allocated among users on the basis of various non-price methods employed by different railroads.

- The grain-transport system has moved very large quantities of grain in the car-shortage periods of the post-1980 era (from 1987–88 on). Feeders and processors have received their grain on time; exporters have not been forced into default or had to pay heavy ocean demurrage charges.

- Peak-demand periods present grain shippers with difficult car-supply problems, but merchandisers and sophisticated elevator managers are, generally, capable of coping with those problems and, at times, finding profit opportunities in them.

The fundamental problem lies in the fact that, when grain-market prices are offering the prospect of good trading margins, not all market participants who want to sell at that time will be able to do so.[28] Some will be unable to obtain cars and will miss the opportunity, necessarily transient, presented by the demand surge that passes through the market. This problem of allocation of opportunity among traders competing to use the system at a peak-load time is a permanent and inescapable feature of the physical grain markets and the grain transport system. This is so because grain shippers' demand for cars fluctuates widely over the year, and the peak-demand period rarely lasts for more than four months or so.

If the railroads were to invest in all the cars required to accommodate the peak demand, they would acquire substantial assets that would generate no revenue for several months in the year. Grain traders would not be able to pay the level of rates necessary to give the railroads (or anyone else) the return required to justify such an investment. This is not to say that the current grain-car fleet represents an optimal level of investment. Because of the way car use is

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[28]Essentially the same point is made in the statement of Gary L. Mills, Assistant Vice President, Cargill, Incorporated, before the ICC, Ex Parte No. 490, Grain Car Supply — Conference of Interested Parties. Mr. Mills states that, in 1989–90, Cargill had no difficulty loading ships or receiving grain for processing, but also had elevators that could not ship for lack of cars. In a telephone interview, Mr. Mills extended this statement to cover all car-shortage episodes from 1987 on.

priced, railroads tend not to receive the extra revenue that would otherwise flow from peak demand for grain shipment. For this reason, and for others, the size of the current fleet is probably sub-optimal; this point will be discussed further in the next chapter.

What is important here is that, whatever the economically optimal capacity for rail grain-shipment, it will never be large enough to accommodate the peak-demand surges. There will always be grain traders who are unable to ship in these surge periods and who are forced to forgo opportunities they perceive for selling on wide trading margins. What we have is, in one sense, a business problem for the sellers of grain—the merchandisers and the elevators. In order to ship in peak periods, they must either make sure of cars in some way or accept uncertainty in car supply (i.e., become lottery participants). It is important to understand that most of these people do not treat this as an occasional problem; they treat it as a permanent part of their working environment. Most market participants constantly consider the likelihood and timing of car availability, price, advance notice requirements, and other factors that may be relevant. These questions about car supply are as much a part of the day-to-day calculations of merchandisers, sophisticated elevator managers, and other market participants as are cash grain prices and Chicago futures.

There is, of course, a close linkage between car shortage and the strength of cash bids. The high bids for grain reflect both an increased demand for grain and an increased demand for grain movement; the demand is for delivered grain: at export terminals, at feedlots, and at processing plants. Both grain and movement capacity are required to meet this demand. The high cash bids that occur at a peak-demand time reflect, in part, the fact that the volume of grain moving is getting close to the system's capacity limits. If, in some way, more cars suddenly became available at such a time, more grain could be delivered and those high cash bids would come down. Part of the margin—possibly a large part—that some elevators may miss for lack of cars would therefore disappear, if all the elevators that wanted to sell were able to get cars at that time.

Another way to look at this is to consider the effect of export sales on the grain markets and the demand for grain movement. Almost invariably, it is volatile export demand that causes the peaks that lead to car shortages. Export firms, seeking to buy grain to cover contracts, or otherwise exploit export opportunities, will bid up cash prices for delivery at their terminals. Cash prices will rise faster than the futures market so the basis will rise. Further, rising cash prices will pull up the price of the nearby contract relative to farther-out contracts and there will be an inverted market. This will be a signal to every elevator holding grain to sell—the "carry" has gone out of the market and there is no reward for continuing to hold grain.

The sudden demand for grain movement results in a car shortage; only those elevators that are lucky enough to get tariff trains and those that have provided for cars ahead of time will be able to ship and realize the wide margins offered by the market. The others will be frustrated. However, if all the frustrated elevators were suddenly able, by some magical intervention, to get cars (and sufficient locomotive power), the strong upsurge in the supply of

grain for delivery at export terminals would bring down the high cash bids offered by the exporters. The nearby futures contract would fall, the basis would fall, and the market would cease to be inverted. The "carry" would be back in the market and there would be no strong incentive for elevators to sell. The frustrated elevators that magically got cars would find they had no reason to use them. Take away the car shortage, and you take away the tempting trading opportunities that go with it.

Attempting to gauge the severity of car-supply problems is also a source of frustration. In **SECTION B**, we discussed the point that it is difficult to interpret numbers on order backlog or delay. There are truly fundamental questions about what such numbers mean. For example, it is noteworthy that, as the 1987–88 shortage came to an end, unit-train orders on the BN equivalent to 58,750 cars were canceled in the third week in April.[29] In early March of 1990, 15,000 orders for BN cars were canceled.[30] (Possibly, the lower number reflects the influence of COTs or of cancellation charges.)

Certainly, many shippers ordered more cars than they could have used, ordering ten trains, for example, in the hope of getting five. But some of the canceled orders represented cars that shippers definitely intended to load. However, even if we knew how many of the canceled orders were in the latter category, we would still not know very much. At first glance, it might appear that we would know how much additional grain would have been shipped at that time if more cars could have been placed. But this is an illusion. What it tells us, really, is how much more grain *would have been offered for delivery at the prevailing bids*, but, as we have just seen, those bids reflected, in part, the limits on grain movement capacity. If more grain could have been shipped, those bids would have been lower, and we do not know how much additional grain might have been shipped in that period; possibly not much. All we really know is that some traders missed an opportunity that others were able to take advantage of; one shipper's loss was another's gain.

Viewed in this way, we see that it is not very useful to try to quantify an overall car-supply problem in terms of orders unfilled or late delivery of cars. In terms of the costs to society, we are primarily looking at the costs stemming from an inefficient mechanism for allocating scarce capacity to ship grain among competing users. From the point of view of individual elevators or merchandisers, these costs take the form of missed opportunities either for profit or for avoiding loss. It is quite clear from our investigation of grain-marketing operations that these costs are not distributed evenly across market participants. They fall disproportionately on the elevators with less sophisticated management, those that do not plan carefully for car supply as late fall approaches, and those that are reluctant to make forward

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[29]Alan Fitzwater, Vice President Government Affairs, BN Railroad Company, Statement Before Committee on Energy and Commerce, U.S. House of Representatives, May 2, 1988.

[30]Conversation with BN staff.

commitments (either through advance ordering or financial commitments such as leasing private cars, purchasing COTs or PERX, or other mechanisms).

As noted in **SECTION A**, these will be the smaller elevators, those that cannot afford expert staff and that cannot or will not avail themselves of assistance through consultants or alliances with some merchandisers. They are also likely to be facilities on branch lines that are more costly to serve than are facilities on mainlines. On many railroads, mainline stations will inevitably get some preference over branches as car-allocation decisions are made and facilities with unit-train loading facilities may get preference over those without them. Through lack of sophisticated management, through lack of train-loading facilities, and through location, these will tend to be the least efficient elevators.

To some degree, the inefficiencies of these elevators will be passed on to their farmer suppliers in the form of reduced bids. The elevators that consistently miss the best trading opportunities will not be able to match their competitors' bids; and, in the case of cooperatives, they will have lower earnings to turn back to their members. Some of these costs, then, are passed on to the farmer although to what degree is not clear. Farmers, generally, have a choice among elevators and can avoid a relatively inefficient elevator and sell to those that consistently bid higher. As previously noted, farmers with large trucks, particularly those with semi-trailers, may have a wide range of options in this regard. Thus, inability to compete effectively when car supply is tight may simply add to pressures on elevators that are already struggling. Many industry observers believe that there is a steady trend towards fewer entities in the elevator business, though not so much towards fewer facilities. While undoubtedly harsh on the managers of less competitive elevators, this trend may be beneficial in terms of greater efficiency in grain marketing and higher returns for farmers.

Some of the costs associated with grain-car allocation will, however, be more widely distributed across merchandisers and elevators. This is true to the extent that cars are allocated by non-price mechanisms; and this is true of all cars except private cars and those provided under COTs or PERX. For the most part, non-price allocation will not reward efficiency. To the degree that railroads give priority to advance ordering, the non-price systems will give some reward to forward planning and, to the extent that shippers maintain orders into the time-frame where cancellation charges apply, some reward to risk-taking. Beyond that, however, shippers receive cars (i.e., profit opportunities) for reasons that have nothing to do with the efficiency with which they conduct their business or the magnitude of the opportunities before them. In economic terms, the cars are not allocated to the shippers who can make the best use of them.

There are also costs to the railroads from using non-price allocation methods. One cost is that railroad revenues do not reflect the peak demands for grain movement. Another is that inefficient allocation systems may reduce efficiency of car utilization and cause railroads to lose revenue to other carriers (when grain is trucked between facilities on different rail lines) or to other modes (when grain is trucked to the end-user).

In sum, the economic damage from car-supply problems does not stem from reduced grain shipments and is not to be measured in terms of unfilled car orders or delays in car placement. Unfilled orders simply measure the degree to which demand exceeds capacity in the absence of a price-based allocation system. The car-order backlog is only a symptom of the true economic problem, which is the inefficiency of non-price mechanisms for allocating scarce resources in the face of strong demand.

Within the scope of this study, we have no way to quantify the costs stemming from this inefficiency, but this is where the true economic costs of car-supply problems reside. When demand for grain cars rises to the point where the system comes under strain, cars are allocated not to those who can make the most economic use of them, but, in effect, to those who win a lottery.

CHAPTER III

TRENDS IN RAIL CAPACITY FOR GRAIN MOVEMENT AND FACTORS AFFECTING IT

FOREWORD

This chapter is concerned with the factors that influence decisions of railroads and other firms regarding investment in capacity for moving grain, or more generally, decisions regarding the allocation of resources to grain movement. Whereas the previous chapter was concerned with allocation of this capacity among competing users, this chapter is concerned with the forces that affect the magnitude of that capacity.

This examination of influences on rail grain capacity is an essential aspect of our overall analysis. As observed at the end of Chapter II, however, no economically rational increase in capacity can, in and of itself, eliminate the problems that stem from non-market allocation of grain-transport capacity in peak-demand periods. Our presentation includes a conceptual discussion of these issues and a brief survey of information available on recent trends in investments in capacity for grain movement.

This material is presented in four sections and a summary:

SECTION A— RECENT TRENDS IN INVESTMENT IN RAIL GRAIN CAPACITY

SECTION B— FEDERAL ACTIONS AFFECTING DEMAND FOR GRAIN MOVEMENT BY RAIL

SECTION C— RAILROAD ACTIONS AFFECTING GRAIN CAPACITY

SECTION D— INSTITUTIONAL FORCES AFFECTING INVESTMENT IN GRAIN MOVEMENT CAPACITY

SECTION E— SUMMARY

SECTION A—RECENT TRENDS IN INVESTMENT IN RAIL GRAIN CAPACITY

This section is concerned with the actual recent trends in investment in railroad grain cars. Figure III-1 presents data on all freight car investments. The lower curve in Figure III-1 shows deliveries (called "installations" in the industry) of covered hopper grain cars (C-113s) from 1970 through 1992. The upper curve shows deliveries of all other freight cars over the same period. Both curves include purchases by private buyers as well as railroads. There is a considerable degree of correspondence between these two curves, showing that purchases of grain equipment moved in roughly the same pattern as investment in other rail equipment. Both curves show a steep decline from 1980 highs, with some recovery later but nothing approaching a return to the levels of the late 1970s.

The freight car installation data illustrate that, while there are definitely some special factors that have had a powerful effect on grain-car purchases, much of what we see reflects a pattern across all rail equipment. Figure III-2 illustrates locomotive deliveries over 1970–92, and we see a repetition of the same approximate pattern. The recession of 1980–82 is a major part of this phenomenon, but it is clearly not the whole story. The trend toward lower levels of investment in cars and power (low by recent historical standards) extended through the 1980s, with some slight recovery towards the end of the period. (The 1991 drop in locomotive and car deliveries must certainly reflect the recent recession.)

Without doubt, a major part of what we see reflected in Figures III-1 and III-2 is a significant increase in the productivity of railroad equipment over this period. Revenue ton-miles per locomotive rose from 32.7 million in 1980 to 59.2 million in 1992. Revenue ton-miles per car rose from 537,000 in 1980 to 909,000 in 1992, an increase of 69 percent. It may be worth noting that railroad productivity in general has been going up. Revenue ton-miles per employee, for example, increased by 157 percent over the same period.[31]

A good part of this productivity growth is due to changes in railroad management attitudes following passage of the Staggers Act in 1980. The relative freedom to adjust rates according to costs and market opportunities, to leave unprofitable markets and exploit profitable ones, and to enter into contracts with customers for specified service/rate packages all combined to give rail management new opportunities and incentives. These opportunities to control costs and improve efficiency and service had simply not been there before.

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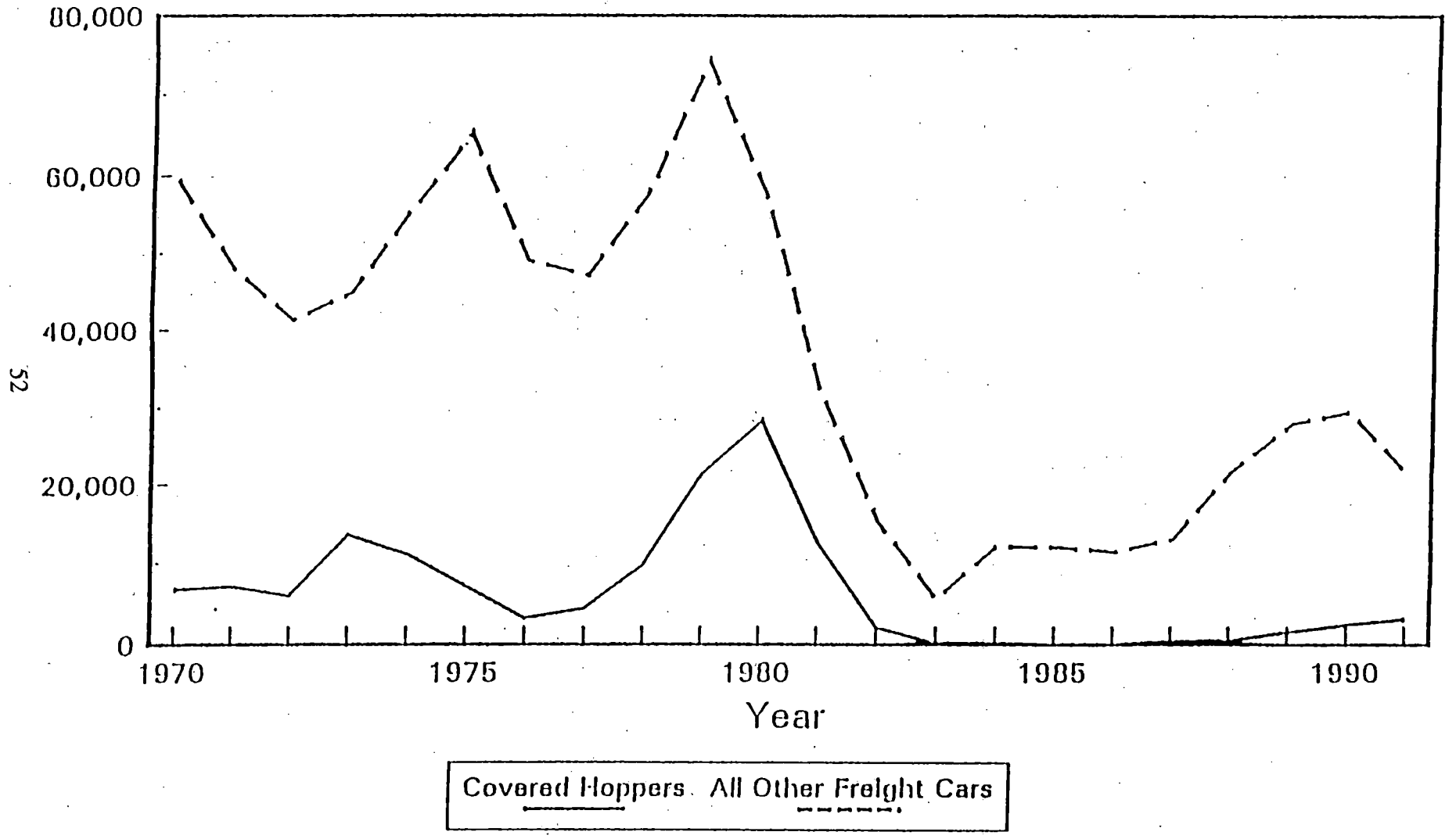
[31]Association of American Railroads, *Railroad Facts*, 1993.

FIGURE III-1.

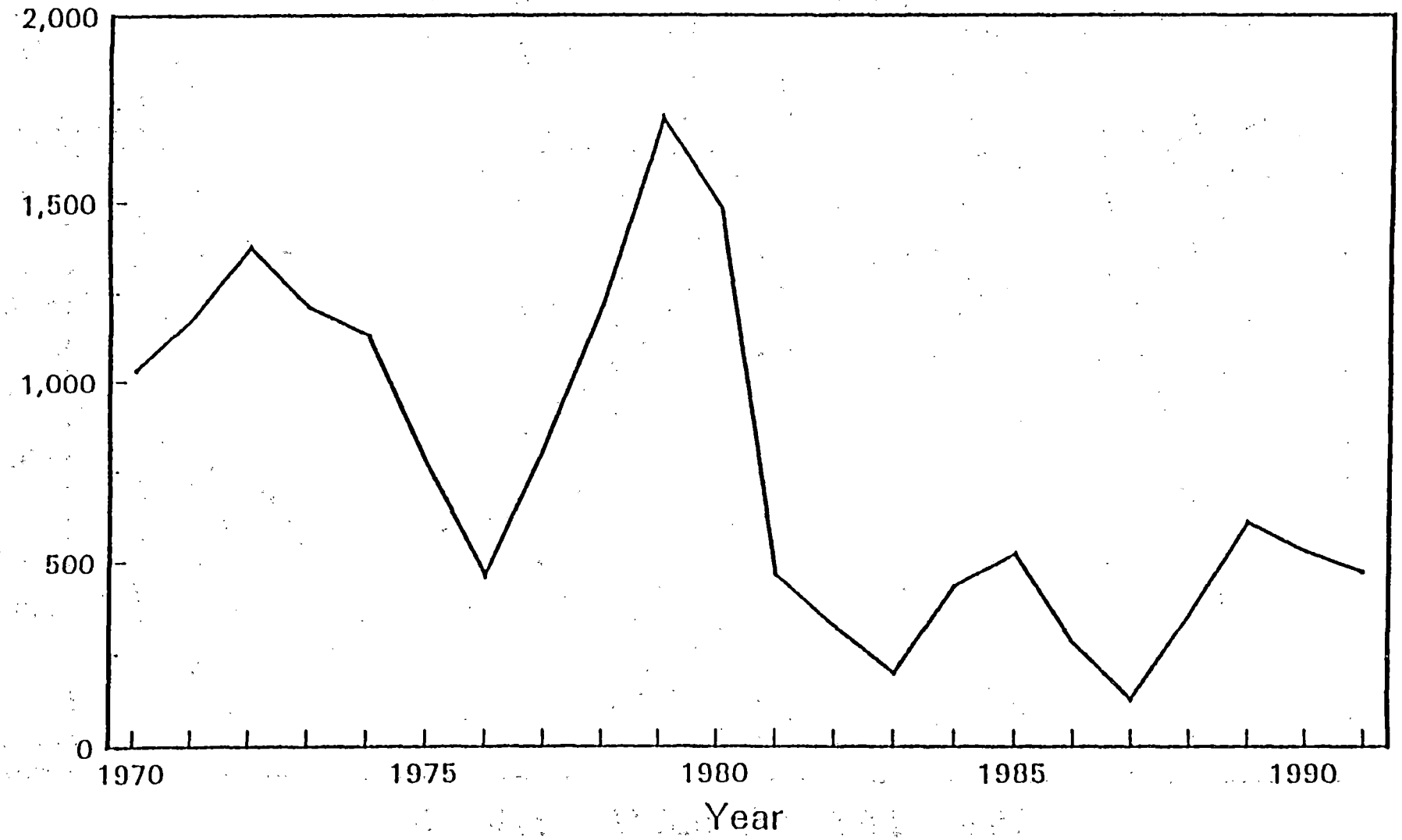
INSTALLATIONS OF COVERED HOPPER CARS AND ALL OTHER FREIGHT CARS



Source: Railcars For Grain, U.S. Dept. of Agriculture, 1989.
Railroad Facts, Association of American Railroads, 1992 and 1986.
Harding & Associates.

FIGURE III-2.

NEW LOCOMOTIVE ADDITIONS



Source: Railroad Facts, Association of American Railroads, 1992 and 1986.

Rail productivity growth since the Staggers Act is apparent in the steady fall in real (inflation-adjusted) rates per ton-mile since 1980. In the 1980–91 period, real rates for all rail traffic declined by 31.2 percent. Over the same post-Staggers Act period, real rates for farm products fell even more, dropping by 45.1 percent.[32]

Very powerful factors specifically driving covered-hopper demand (which also applied to barges) were the grain-export boom of the 1970s and its collapse in 1981. While it lasted, strong export growth in the 1970s, and the expectation of its continuation, led to heavy buying of grain-carrying rail cars by both railroads and private investors. A strong additional factor influencing private buyers was the availability of the investment tax credit (since repealed) for purchases of barges and rail cars. Forty-four percent of the C-113s delivered in the 1970–1980 period were for private buyers.[33] Grain industry observers are in agreement that no private cars have been ordered since 1980, although it is thought that some may be ordered in 1994. Railroads stopped buying as well, and virtually no additional grain cars were delivered until 1989.

Thus, the covered-hopper fleet was declining through the 1980s as surplus capacity was worked off. It appears that the downward trend has now bottomed out and that the fleet is growing slightly. There is a consensus among observers that the annual retirement rate is now around 1.5 percent,[34] and new purchases have been exceeding that level since 1991.[35]

Some observers expect deliveries to continue to exceed retirements in 1994 and 1995, including some sales to private buyers. These observers believe that, with one-year lease rates at $425–$430 per month, the return on a grain car is enough to justify the investment at current low interest rates; others dispute that and maintain that lease rates must go higher before there can be significant new capacity buys.

In any event, while the fleet may once again be growing somewhat, at present there is no sign of a strong uptrend in the number of cars. The consensus estimate is that there are currently about 100,000 (plus or minus 5,000) covered hoppers in grain service. This is based

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[32]Interstate Commerce Commission, Office of Economics, release entitled "Rail Rates Continue Multi-Year Decline," November 1993.

[33]Jerry Norton and Keith Klindworth, *Railcars for Grain—Future Need and Availability*, USDA, July 1989, Table 10, p. 20.

[34]Conversations with BN, USDA, and Harding and Associates, St. Charles, Illinois.

[35]Harding and Associates.

on the view that the current fleet of C-113s is about 160,000 with about 62 to 63 percent of annual loads consisting of grain.[36]

[36]Conversations with BN, USDA, and Harding and Associates. William C. Harding, President, Harding and Associates, states that analysis of the 1991 Waybill Sample showed that 62.5 percent of C-113 loadings were grain in that year.

SECTION B—FEDERAL ACTIONS AFFECTING DEMAND FOR GRAIN MOVEMENT BY RAIL

Federal Government actions can and do affect both the timing of, and the overall level of demand for, rail grain movement. This is particularly true of Department of Agriculture (USDA) programs regarding grain exports; demand for rail grain movement is also affected by the government's investment in additional capacity for barge movement on the Mississippi and by the level of charges imposed on users of navigation facilities on the river.

USDA PROGRAMS

At times in the past, the Commodity Credit Corporation (CCC) has been in a position to have a substantial impact on grain movement. Stocks of grain acquired through price support loans to farmers grew rapidly in the first part of the 1980s, reaching a peak of more than three billion bushels at the beginning of 1987 (see Figure III-3). (By way of comparison, total production of corn, wheat, and soybeans in the 1987–88 crop year was about 11 billion bushels.) Shifts in federal policy (embodied in the 1985 Farm Act), combined with the 1988 drought, led to a rapid decline in CCC stocks that was especially steep in 1987 and 1988.

The CCC's build-up of stocks in the early 1980s was a result of the collapse of U.S. exports in 1981. Some observers link this collapse to the 1980 embargo on grain sales to the Soviet Union. Another, perhaps more systemic, cause had to do with changes in the world grain market and with U.S. price support policies. In the early 1970s, the U.S. dollar was low, and foreign capacity to produce grain was not nearly as great as it is today. At that time, the Soviet government made a decision to increase imports of corn (and other feed grains) in order to increase meat production. For these reasons, grain exports boomed throughout the decade.

At the same time, however, world demand for grain was rising and non-U.S. production grew rapidly in response. Around 1980, the Federal Reserve System tightened monetary policy to choke off inflation and, as a result, the dollar soared on foreign-exchange markets. U.S. domestic grain prices rose above world levels and U.S. grain became virtually unsalable on the world market. With the sudden drop in demand, CCC was forced to take excess grain off the market under the price-support policies then prevailing. At that time, the government loan rate[37] for grain was set in a way that followed production costs. The 1985 Farm Act changed loan-rate policy to bring the domestic market more in line with the world market. Other changes were made as well and CCC stocks were rapidly liquidated.

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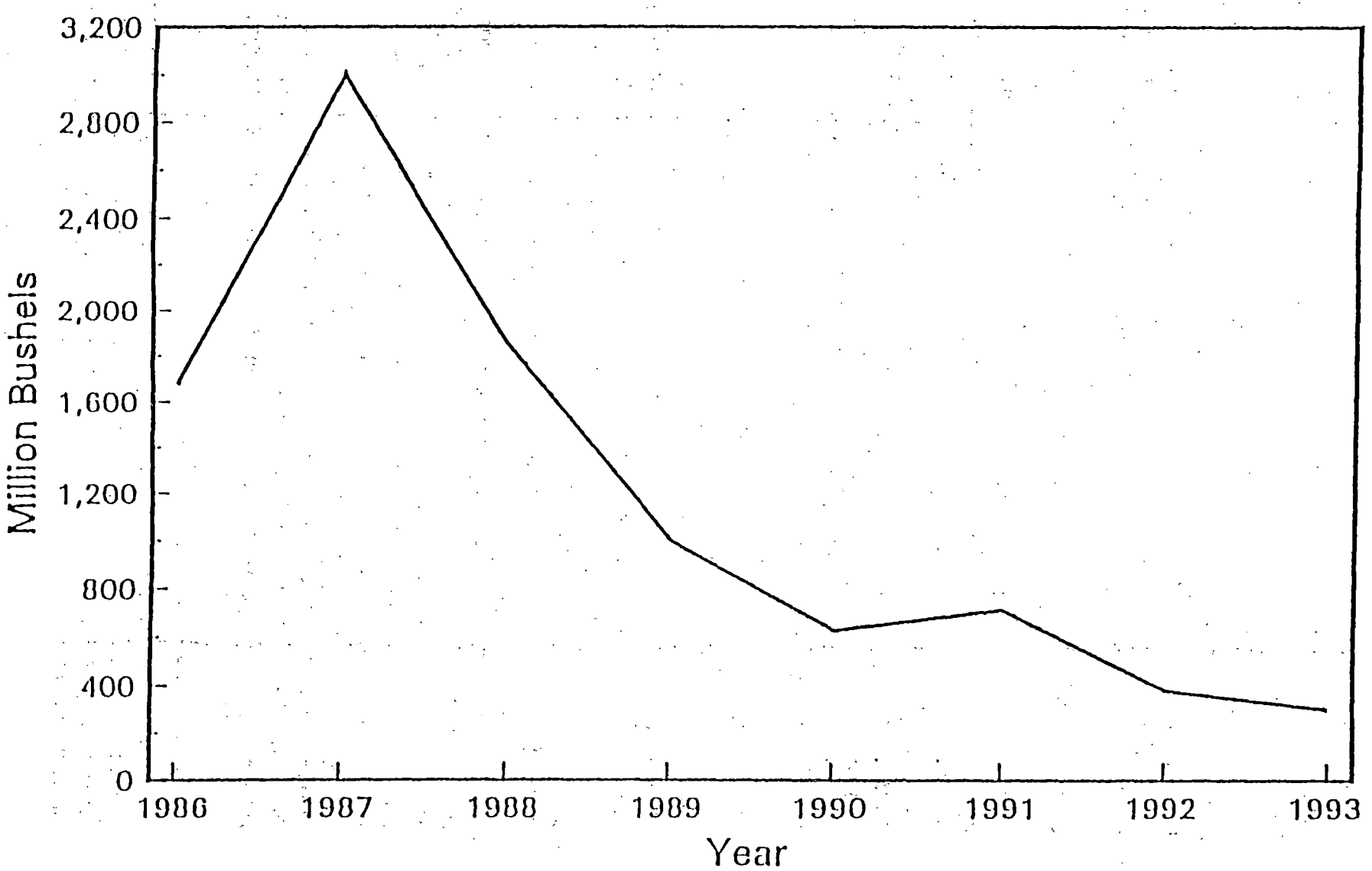
[37]The loan rate is the amount that the government will lend to farmers on their grain; it sets a floor under the domestic grain market. The loan rate is defined as a percentage of a target price; in the period under discussion the target price was established on the basis of production costs.

FIGURE III-3.

CCC-OWNED GRAIN INVENTORY



Source: Commodity Credit Corporation.

Much of the stored grain was sold into the export market and some of the steps that CCC took to accomplish this were extremely disruptive of car supply. Grain held in on-farm storage was repositioned to storage terminals as near to export ports as CCC could find them. The repositioning moves coincided with the 1987 harvest and a large sale of wheat to the Soviet Union. In the late fall of 1987 and the winter of 1988, 700 million bushels of wheat were released from storage and moved towards ports. (As noted in Chapter II, this amounted to one-third of the 1987–88 wheat crop of 2.1 billion bushels and almost half the exports of 1.6 billion bushels.) Not only was CCC pushing huge amounts of grain through the system at the busiest time of the year, but these moves consumed more than the usual amounts of rail capacity as CCC moved stores into small terminals in west Texas, where tracks could not receive unit trains. Most observers, including CCC officials, believe these actions contributed significantly to the car shortage of 1987–88, the first car-shortage episode of the 1980s.

This situation, however, is not likely to recur, unless the government once again changes policy and accumulates large stocks of grain. As Figure III-3 shows, CCC stocks are now at very low levels. Of the current inventory of 215.4 million bushels, 195.3 million are either in the Food Security Wheat Reserve for developing-country emergencies or in the Disaster Reserve for domestic emergencies. For all practical purposes, the government stocks available for export have disappeared.

The Export Enhancement Program (EEP) of USDA and some other export subsidy programs played a major role in the car-shortage problems of 1987-88, because they were used to finance the exports of CCC stocks. With the disappearance of those stocks, EEP no longer has the capacity to abruptly force additional amounts of government grain into the system on top of what private sellers are already moving.

EEP does have some impact, however, on timing of demand for cars. A large proportion (57.4 percent of wheat sales[38]) of grain exports are EEP-financed. Merchandisers responding to foreign tenders for grain must apply for EEP financing and cannot commit themselves to a contract with the buyer until USDA approves the application. The approval may be some time in coming, and a tender will usually contain a delivery deadline. Slow action on the EEP application narrows the time window available to the exporter for getting the grain to a port, thus increasing the urgency of his demand for rail shipment and increasing the pressure on system capacity.

RIVER CAPACITY AND USER CHARGES

The two issues here are the capacity of the Mississippi River navigation system for barge movement and the price charged by the Federal Government for the use of that system.

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[38]USDA, Foreign Agricultural Service, unpublished draft. "Export Enhancement Program Awards for Fiscal Years with Commodities and Countries," September 2, 1993.

The capacity of the river is determined by the amounts the government chooses to invest in replacing and expanding the capacity of the current set of locks and dams. The Army Corps of Engineers estimates future investment requirements based on its projections of traffic and benefit-cost models that are intended to show the efficient level of investment associated with that projected traffic.

Current Corps estimates show traffic on the Upper Mississippi doubling between 1987 and 2020.[39] The Corps' analyses indicate that substantial investment will be required to bring river capacity to the efficient level indicated by this traffic growth.[40] Observers express concern that the projections are too optimistic and that, for any given level of traffic, the Corps' benefit-cost model points to too high a level of investment.[41]

Authorization bills for navigation projects require that 50 percent of the funds for new investment be supplied by the revenues from the fuel tax on inland barge operations. Under current law, that tax is being phased in and will reach a maximum of 20 cents per gallon in 1995. At the 20-cent level, the revenue from the tax will support less than half the Corps' projected investment program for 1995–2020.[42] A recent effort to further increase the fuel tax as part of the Administration's budget failed; whether the tax will be raised much, if at all, in the next several years is highly problematical. The increase sought by the Administration would have been used to finance operation and maintenance expenses, but the political fate it met suggests that increases for investment purposes are equally unlikely to occur.

In light of these uncertainties, a reasonable scenario should assume that traffic on the river will definitely increase (if not by as much as the Corps projects), that the fuel tax will not be increased by enough to support sufficient investment in capacity to offset the increase, and that Congress, reluctant to increase spending from the General Fund, will not ease the requirement that 50 percent of new investment come from user charge revenues.

Based on that scenario, when demand for grain movement increases by more than the capacity enhancement on the river, the growth in grain traffic will have to move on the railroads. If current institutional restraints on rail rate increases remain in place, barge rate

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[39]L. George Antle, "Conclusions and Recommendations to Phase III Inland Waterways Investment Analysis," in *Inland Waterways Users Board, Fifth Annual Report to the Secretary of the Army and the U.S. Congress*.

[40]C. Phillip Baumel, "Waterway and Railroad Shipments of Agricultural Commodities: Alternative Investment Strategies," presented at A Research Symposium: Transportation Infrastructure as Public Investment Strategy, at the University of Minnesota, October 1992.

[41]*Ibid.*

[42]*Ibid.*

spikes under peak-demand conditions will shift even more demand to rail as rail carriers' prices do not respond to the demand increase.

Nonetheless, rail revenue would increase and there would be some incentive for carriers to buy more cars; but in light of the increased demand for movement, car-allocation problems would become no easier and might well get worse. In other words, absent significant changes in the constraints on pricing of rail grain movement and of cars, this reasonable scenario would lead to no reduction in the inefficiencies associated with the current car-allocation systems (discussed at the end of Chapter II and also later in this chapter).

An increase in river capacity accompanied by an increase in user charges might lead to some increase in rail grain capacity, since the increased waterway user charges ought to lead to higher rail earnings from grain movement. (This would happen because increased user charges would lead to higher barge rates; higher barge rates would mean greater market share for rail and/or higher rail rates for river-competitive traffic.) In the absence of meaningful change with regard to pricing of rail grain movement and cars, none of the probable outcomes with regard to river investment and user charges is likely to lead to much improvement with respect to rail grain car-allocation problems.

SECTION C—RAILROAD ACTIONS AFFECTING GRAIN CAPACITY

Railroads can increase their earnings from grain cars and grain movement by increasing the rate at which they utilize their covered hoppers. Since increasing utilization means that a hopper carries more grain per unit of time, it also means increasing system capacity. There are, doubtless, a number of ways of increasing car utilization that relate to engineering or traffic control techniques; such methods are outside the scope of this study. There are, however, several measures affecting utilization that have to do with dealings between railroads and grain merchants, and these are the focus of this section.

TRAINS DEDICATED TO A RECEIVER

One measure affecting utilization is the dedication of trains to a receiver. Following this practice, referred to in Chapter II (e.g., the discussion of CNW's "cycle trains"), a railroad will assign some number of trains (e.g., ten 75-car trains) to a customer for that customer's exclusive use and under that customer's virtual control. The customer in question is usually a large receiver (e.g., a feeder or a processor); in one case the customer is a large, high-volume river terminal. Typically, only one destination, or a small number of destinations, will be involved. The arrangements may or may not be embodied in a contract. There may simply be an understanding that the receiver may use the trains as long as they are kept employed.

With regard to capacity, a key feature of these arrangements is that the receiver undertakes to give the railroad as much advance notice as possible of where and when trains are to be placed for loading and where they are to go, once loaded. Further, since the receiver is in control of the inbound traffic at the destination, it can avoid congestion build-up at the destination while maintaining a high volume of movement. The resulting improvement in operations allows the railroad to "turn" those trains more frequently than it otherwise could. Capacity is increased, the railroad increases its earnings, and the receiver gets better service—and an assured supply of cars.

These dedicated-train arrangements are a source of some discomfort among railroad customers who are not able to use them. A primary concern is that the receivers that are party to such agreements will exploit their control over the trains when buying grain from merchandisers or elevators that are uncertain of car supply. The same objection, however, can be raised to any arrangement—COTs, car pools, leased cars—by which a grain trader may secure a guaranteed supply of cars. A grain merchant who can be sure of getting cars always has the advantage, in car-shortage periods, over the trader who is uncertain about getting cars.

Another point sometimes raised is that these agreements leave fewer cars available for other railroad customers, thus exacerbating the allocation problem during a car shortage. This, however, is a misleading view of the matter. If a receiver uses cars with greater efficiency but does not increase the amount of grain he moves per unit of time, there are, in the short run, more cars available for other customers.

But the greater efficiency could cause a receiver to move more grain to the extent of using as many cars as he did before, or even more cars. A merchandiser, for example, might find his transportation costs reduced and be in a position to bid grain away from his competitors. In this case, the railroad in question might have fewer cars, in the short run, to allocate among other customers. This might exacerbate allocation problems among those customers (although, collectively, they would likely be shipping less grain).

To call this a worsening of car supply, however, only illustrates the contradictory meaning of the phrase, "car shortage"; in fact, capacity has increased and more grain is moving in the peak-demand period. What is really happening in this scenario is that market share is increasing for the trader who is able to make more efficient use of cars. And, since this merchandiser is bidding grain away from his competitors, the elevators he buys from and, in turn, the farmers that supply those elevators must be getting some of the benefit from the increase in efficiency.

The foregoing discussion is in a short-run context and, thus, assumes a fixed number of cars. The cycle-train arrangement will, however, reduce the carrier's costs for moving a given amount of grain per unit of time; if there is no offsetting reduction in rates, this leads to an increase in the firm's earnings from grain carriage. Depending on the additional revenue to be derived from moving more grain, the long-run effect could be an increase in the number of cars the railroad employs in grain service (which could include railroad-owned or leased cars or private cars); or the railroad could take advantage of the increased utilization by shifting resources out of grain service. In sum, the increased capacity generated by the cycle-train arrangement could lead to an increase in capacity offered to all grain customers; it need not cause offsetting losses elsewhere in the system. Such agreements do, however, shift competitive advantage towards those market operators that are able to use them.

DISPATCH PAYMENTS

A dispatch payment is, in effect, the opposite of demurrage. Demurrage is a penalty for failure to load (or unload) and release a vehicle or vessel within an agreed time; dispatch is a reward for speedy release. The BN has recently, in March and April of 1993, initiated programs for payment of dispatch under certain circumstances. As with the dedicated-train arrangements just discussed, the objective is to improve the utilization of cars.

BN has two programs, one called "Origin Efficiency" and one called "Origin Destination Efficiency." While there are a number of minor requirements (e.g., electronic transmission of the bill of lading), the essence of Origin Efficiency is that BN pays to the customer an allowance of $30 per car if a unit train consisting of 26, 27, 52, or 54 cars is loaded and released within 24 hours of placement (to be precise, 24 hours from the first 7:00 AM following placement).

The Origin Destination program is somewhat more complex and more demanding of the customer. It applies only to corn, soybeans, or sorghum with destination at a Pacific

Northwest export elevator served by BN. The shipment must be a 108-car train (which may consist of two 54-car unit trains loaded at two different locations if BN accepts the two locations as suitable). The requirement at origin is that the 54-car trains must be loaded and released on an agreed day within 12 hours of the 11:00 AM after placement (provided BN places the cars before 11:00 AM—if BN is late, the 12-hour period need not start until 7:00 AM the next day). At destination, the full 108-car train must be unloaded and released as a single unit within 12 hours of placement. If these, and some other conditions, are met, BN will pay the customer $200 per car.

Assuming 3,500 bushels of corn per car, the $30 payment for "origin efficiency" is equivalent to 0.9 cents per bushel and the $200 payment for "origin destination efficiency" amounts to 5.7 cents per bushel. The former amount would be a noticeable incentive for many traders, but the latter is a truly large payment. The conditions for the Origin Destination program are stringent, and the cost to the exporter (it would have to be an exporter) of meeting such requirements is not known. The larger allowance, however, is equal to or in excess of the dealing margin on many grain transactions.

A merchandiser receiving this kind of advantage on transportation cost is in a very strong position to outbid competitors when buying grain. A country elevator owned by such a merchandiser or selling to such a merchandiser would be able to draw grain from substantial distances, taking business from elevators not able to load 54-car trains and not well positioned with respect to other elevators. An elevator that could participate in such a transaction would not have to be on a main line, but it would have to be so located as to form one of a pair suitable for placing and retrieving the two trains in a single move.

HEAVIER LOADING GRAIN CARS

Most of the grain cars bought since 1989 are a modification of the previous standard C-113, which rated 263,000 pounds gross weight, 100 tons net. The new cars are 286,000 pounds gross (no increase in cubic capacity) and can be loaded with 103 tons of corn or 110 tons of wheat or soybeans. Railroads are ordering the heavier loading cars because they lead to reduced operating costs.[43] The reduced operating cost should lead to increased returns from grain service and some investment in increased capacity. Larger cars mean that fewer cars are needed for the amount of grain being moved. Fewer but larger cars could have a slight negative impact on the car-allocation problem, even though capacity for moving grain would be improving. Again, this highlights the fundamental contradiction in the notion of car shortage. It has also been noted that the increased weight of cars and trains poses a potential problem for elevators on branch lines that have lighter-weight rail or marginal bridges.

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[43]Baumel and Van Der Kamp, Feedstuffs, "Heavier Loaded Grain Cars—Are They Coming and What are Their Impacts?" Vol. 65, No. 20, May 17, 1993, pp. 62-63.

SOME IMPLICATIONS OF THESE RAILROAD ACTIONS

Dedicated-train arrangements, BN's dispatch payments, and increased car capacity all drive this market in the direction of increasing capacity; they also have the effect of shifting the competitive balance among grain-market participants. The gainers are the merchandisers and elevators that are able to take advantage of these measures; the losers are the merchandisers and elevators that are not able to exploit these opportunities. Farmers seem likely to be gainers as more efficient merchandisers and elevators are able to offer higher prices for grain.

SECTION D—INSTITUTIONAL FORCES AFFECTING INVESTMENT IN GRAIN MOVEMENT CAPACITY

As with any substantial business, railroad managers usually make investment decisions within the constraints of an annual capital budget. A capital budget will often be developed in the context of a multi-year investment plan, but will be adjusted each year for changing conditions. Two different decisions (or sets of decisions) are made: the total amount set aside for investment and the projects or purchases to be carried out within that amount. These two decisions are not, of course, independent of each other. Selections among alternative projects will be made according to estimated rates of return, but the overall level of return that can be realized will also affect the total sum to be invested. Other things being equal, the higher the return that can be realized on rail investments, the larger will be the capital budget. As the rate of return declines, alternative uses for funds, e.g., debt reduction (or refraining from debt increase) or increased payouts to stockholders, become more attractive.

Thus, an investment in grain-hauling capacity has to compete with alternative uses of the rail firm's capital, including the alternative of shifting capital out of the rail business (or refraining from putting it in). Investments in a variety of rail equipment affect grain-hauling capacity (cars, power, track, and communications and traffic control), and we need to note factors that affect all of them. Nonetheless, our primary focus here is the C-113 covered hoppers, which make up the rail grain fleet.

Other investors, principally equipment leasing companies, may also buy covered hoppers. Their decisions are guided by the same basic factors that influence railroad managers; they must look at the rate of return offered by grain cars and compare it with returns offered by alternative uses of their capital. There is a significant difference, however, between the way in which a grain car generates revenue for a railroad and the way in which it generates revenue for a leasing company. A railroad's revenue comes from customers who pay by the movement, i.e., payment for a movement of some number of loaded cars from one place to another. Typically, but not always, the price covers both the use of the car and the railroad service to move it. (As noted in Chapter II, some railroads quote separate rates: one price for the movement and another price for the car.) A car leasing company, on the other hand, is paid by the month for the use of the car.

As the term implies, a leasing company derives revenue from a grain car by leasing it to some other firm, for a fixed term for a fixed monthly payment. The lessee is likely to be a substantial merchandiser; it could also be any market participant who believes a profit can be made from holding grain cars on lease. Merchandisers who hold cars on lease will use them to move their own grain and will also, according to market conditions, offer them to others on shorter lease. Leased cars are usually available over a range of terms from as short as a single trip to as long as 15 years. Whatever the term of the lease, the lessee receives only the use of a car; he must still pay a railroad to move it.

Thus, both railroads and leased-car holders derive revenue from making grain cars available to grain shippers. They do so, however, in quite different institutional frameworks. In one sense, railroads and private-car holders operate in the same market; the buyers are the same, the cars are the same, and the cars will be used for the same purpose. Railroads, however, are subject to some—albeit limited—regulatory restraint on pricing, and they are also subject to implicit political constraints. Private car-holders, on the other hand, are wholly free of rate regulation, direct or implicit, and lease rates are restrained only by market forces. Thus, railroad-supplied cars and private cars are offered in two quite different sub-markets in which different prices for the same product may prevail at the same time.

The context for private cars has an added layer of complexity. Unless a railroad agrees to move a private car, it is worthless; and the relations between private-car holders and railroads are not simple. It is necessary that we develop some understanding both of the institutional restraints on railroad pricing for grain movement and of the context in which railroads and private holders of grain cars deal with one another.

RESTRAINTS ON RAIL GRAIN PRICING

That rail grain rates are "sticky" on upward movements is beyond dispute. Barge rates and leased-car rates move freely, responding virtually instantly to fluctuations in demand (or supply). If a sudden surge in demand hits the grain market at a time when the upper Mississippi is open, there will be a spike in barge rates; we noted this phenomenon in Chapter II. The rise in barge rates will bring supply and demand into equilibrium in the barge market, and deflect some demand for grain movement from the river to the railroads (and, in time, away from the peak-demand period).

Rail rate movement, on the other hand, will be, at most, sluggish in response to a sudden surge in the demand for grain. Rate adjustment will not be sufficient to equilibrate supply and demand for cars. The limited rate increase will not offer railroads an incentive to shift covered hoppers into grain service from other uses; and, in any event, there can be only limited short-run response in car supply. Cash prices for delivered grain are rising, while prices for railroad-controlled cars are rising slower, if at all. The inevitable result is that shippers, competing for the opportunity to sell in a strong market, demand more grain cars at origin points than can be supplied at that time.[44]

More to the point of this chapter, limited response in rail rates deprives railroads of some of the revenue they could otherwise get from peak demand for grain shipment. Or, put

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[44]As noted in Chapter II, this does not mean there are insufficient cars to move the grain to the buyer; rather, with below-market rates for cars and rail movement creating more attractive opportunities for grain sales, the system cannot accommodate all the would-be sellers.

another way, rigidity in rail grain rates restricts the return that railroads can earn on grain cars and from grain movement.

There appear to be two principal reasons for the stickiness of rail grain rates: regulatory restraint and implicit political constraints. These are explored in turn below.

Regulatory Restraint

Grain is a regulated commodity for rail shipment; railroads must move grain either at published tariff rates filed with the Interstate Commerce Commission (ICC) or under the terms of contracts that carriers may negotiate with their customers. A substantial amount of grain traffic moves under contract. The essential elements of contracts (e.g., rates) are confidential and their terms vary. Typically, however, they establish below-tariff rates in return for guaranteed volumes of traffic; most contracts would preclude a railroad from making a short-term price adjustment (although they usually do not guarantee car supply).

Under the Staggers Act, railroads are comparatively free to adjust tariff rates (unless market dominance can be demonstrated), but 20 days' notice is required before an increase can take effect (a new tariff must be filed at the ICC 20 days before the effective date). Twenty days may not seem a long time; however, reference to Tables II-10 through II-12 indicates that some spikes in barge rates and leased-car rates have not lasted very much longer than that, if that long. It seems clear that, in the absence of the 20-day filing requirement, some railroads would realize more revenue from sudden increases in demand for grain than they now do.

Political Constraints

Railroads are large, profit-oriented institutions with a high public profile in grain-producing regions and a long history of state and federal regulation. Since railroads first became major carriers of grain, there have been periods in which the relationships between railroads and grain shippers have been tense, if not openly adversarial. Justified or not, there has been a perception of railroads as large and powerful enterprises, enjoying a degree of monopoly power in the marketplace, in contrast with farmers and grain elevators, which operate in highly competitive markets. An increase in rail rates for grain movement can attract an intensity of public and political interest that would not, by contrast, be focused on increases in barge rates or leased-car rates. Rail executives may well judge that their wisest course is to avoid attracting such attention; thus, many railroads tend to avoid abrupt increases in grain rates.

Attributing carrier behavior to this cause is somewhat speculative; it is difficult for an outsider to know for certain what influences may be operating on the management decisions of a particular railroad. What is clear, however, is that not all carriers strain the limits when they set rates for grain movement and there is enormous variation in carrier behavior. The BN, through its COT auctions, is fairly aggressive about using price to allocate grain cars among users; according to BN policy, up to 40 percent of its grain fleet may be allocated in

this way. The UP, on the other hand, pursues a policy of avoiding price fluctuation; it allocates cars on a historical basis and gives its customers 60 days' notice of rate increases.[45] The Soo Line has recently introduced an auction (PERX) for allocating 25 percent of its cars. Some carriers will follow a deliberate pattern of raising their tariff rates when demand for shipment rises in the late fall and lowering them when demand eases in the spring; others will not.

Those railroads that do not adjust their rates as demand varies are forgoing revenue that they would otherwise get; they appear to be holding the return on their grain traffic below what it otherwise might be. The most plausible explanation for this behavior is that these managements are deferring to what they perceive as an implicit political constraint. Put another way, they believe that any increased revenue from their grain operations would be offset by political responses, that, one way or another, would adversely affect their interests.

Perceived political constraints are probably not the only reasons for this behavior. Management at some railroads may believe that there are long-run benefits from good customer relations and, therefore, will seek to avoid offending customers with sizable rate increases on short notice. Another explanation for apparent railroad reluctance to use the price mechanism for allocating grain cars may simply be inertia. Railroads are comparatively conservative institutions, and short-term rate adjustment was not an option until after the passage of the Staggers Act. Whatever the reason for railroad behavior in this regard, the ironic consequence may well be that grain shippers receive less responsive service and lower car availability than they otherwise might.

RAILROADS AND PRIVATE CARS

The Basic Relationship

The use of private cars is not, of course, confined to grain shipment; private cars are used across the spectrum of freight traffic. The basic arrangement is straightforward. The railroad moves the shipper's goods but does so by pulling the shipper's cars, rather than the railroad's own equipment. The railroad moves the car, but does not provide the car. In the case of a regulated commodity, such as grain, the railroad's tariff will include a rate for private-car movement.

As noted in Chapter II, a rate for private cars is usually quoted in one of two ways. The more common arrangement is that the railroad offers the shipper a "mileage allowance" to reflect the savings to the railroad from not supplying the cars. The allowance is quoted in terms of cents per loaded car-mile. The customer pays the railroad for the movement at the tariff rate, and then, often somewhat later, the railroad pays the customer the allowance, based on the number of private cars and their loaded mileage.

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[45]Conversation with UP staff.

In the alternative arrangement (sometimes known as a "dual rate"), the railroad's tariff will show two rates: one for a move with the railroad's equipment, a second for a move with the customer's equipment. Either way, the shipper is offered two prices: one for the movement only (railroad does not furnish cars) and one for the movement plus railroad-supplied equipment.

Arrangements concerning private cars may also be covered in contracts. When that is the case, the allowances or dual rates are not subject to ICC regulation. Otherwise, the prices for movement without railroad-supplied equipment are subject to the same regulatory restraints as any other tariff rate for grain movement.

Issues regarding the use of private cars have been a point of conflict between some grain-hauling railroads and private holders of leased cars. Under AAR rules, a shipper that wishes to use private cars must apply to a railroad for permission to load and move its cars on that carrier's territory; the document that the railroad executes to grant permission is an AAR form known as "OT-5." Shippers and carriers speak of "granting OT-5," "denying OT-5," and so forth. Until the early 1980s, railroads freely granted OT-5 applications. Then, in a period of substantial grain-car surplus, some carriers began to limit or deny OT-5 or cancel OT-5 authority previously granted.

ICC Decision in SCOT-5

As a result of these actions, there was a lengthy proceeding before the ICC, known as the "SCOT-5" case (Shippers Committee on OT-5). SCOT-5 culminated in a decision[46] in September 1989. The gist of the Commission's ruling was that shippers had rights to OT-5, but that railroads were within their rights in refusing to load private cars when they had their own cars available. The precise language (pages 878–879) is as follows:

> 1. ...railroads shall cease and desist from denying OT-5 approvals for private covered hopper cars, and from imposing restrictive conditions in OT-5 approvals, except for mechanical or safety reasons or for lack of adequate track storage space.
>
> 2. ...railroads shall cease and desist from refusing to transport shipments in private covered hopper cars tendered by shippers when the railroads *do not have cars available* [emphasis added] to transport the shipments.

[46]ICC Docket No. 39169. *Shippers Committee, OT-5 v. The Ann Arbor Railroad Company, et al.*, 5 ICC 2d 856, September 15, 1989.

Taken together, these statements are contradictory. What the first grants, the second essentially takes away. The key to understanding the second provision is the meaning of "available." The way it is used here implies that a railroad either has cars available to furnish to a customer or it does not; i.e., that the question of "availability" has a yes-or-no answer and that answer is an objective fact, largely outside the control of the railroad. This is not the case. The intensity of demand for grain cars varies over the year; as that demand becomes greater, the potential for the carrier to derive profit from the use of private cars becomes greater. There is no magic threshold at which cars are suddenly no longer available—a railroad always has cars available for some shippers. When a customer asks to use his own cars, what the railroad must consider is whether it earns more by sending its own cars to that customer or by sending its own cars elsewhere and accepting the private cars. (A key part of this consideration, discussed later, is, of course, the price the railroad must pay for the use of the private cars—with the wrong price the railroad could lose money on private cars in a period of high demand and with the right price it could make money on private cars in a period of low demand.)

Thus, whether to make cars available to a customer or to accept his private cars is a business decision for the railroad, and the force of the Commission's language is that a railroad may refuse private cars unless it finds it in its interest to accept them. The Commission took the view that railroads have a responsibility (stemming from the common carrier obligation) to supply cars and therefore have the right to insist on using their own cars as long as they are willing to make them available to a customer. The following language (page 859) expresses this point:

> ...because carriers have a duty to provide cars necessary for the transportation they hold themselves out to provide, they have a corresponding right to use their own cars in preference to private cars in fulfilling this obligation.[47]

The implication is that the common-carrier obligation imposes a duty on rail carriers to provide cars at times, or under terms, that may not be in their best commercial interest and, as an offset, are entitled to a protected market for their cars.

Current Practice

In actual practice, there is a good deal of variation among railroads in regard to private car acceptance. The BN, for example, maintains a firm stance of not accepting private cars unless it is under very heavy demand pressure. Other railroads are more receptive to private cars; some will take them under almost any conditions, provided the shipper will accept the rate offered. This latter, however, is no small provision. Just as railroads follow differing practices with adjusting grain rates according to demand, they also follow (as noted in Chapter II) differing practices in regard to adjusting rates charged when private cars are used.

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[47] *Ibid.*

Some carriers will adjust these rates according to the demand for cars; others will not. Describing rail-firm behavior in this respect can be a little confusing because of the terminology and because two different ways of quoting these rates are in effect. For this discussion, it is useful to think in terms of the carrier paying the shipper for the use of private cars. This is consonant with the practice of paying allowances; the higher the allowance, the more the railroad is paying for the use of the shipper's car. With a dual-rate system, the railroad offers a price for the use of its own cars; the higher the price the carrier charges for its cars, the more the customer gains by using his own cars. An increase in the price for using the carrier's car is, thus, equivalent to an increase in the allowance paid for the use of the customer's car.

Either way, the shipper pays the railroad less when he supplies his own cars. And, on those railroads that adjust price for cars as demand conditions vary, the price will rise as the demand for cars rises—and fall when demand falls. Typically, such railroads will raise the price they pay for private cars in the late fall and lower it in the spring; rather than outright refusing private cars when demand is slack, they offer a price low enough to discourage private cars (and low enough that the railroad will profit from using any cars that may be offered).

It is, thus, possible for a rail carrier to reduce the number of private cars in use on its territory (or ensure that it profits from using them) by lowering the allowance it offers for such cars. It may also restrict the number of private cars on its system by denying OT-5 requests or by imposing conditions (e.g., that the shipper must have sufficient storage track to keep his cars off the railroad's tracks when not in use), or by limiting OT-5 authority to comparatively short periods (e.g., six months or month-to-month). Such rules may deal with wholly legitimate concerns. If a shipper parks private cars on the railroad's track, it can pose operating problems and raise railroad costs. Also, the carrier may well be uncertain, from one month to the next, about how many private cars, if any, it wants on its system or how much such cars would be worth to it.

Nonetheless, these railroad operating concerns can be dealt with through the price mechanism. Operating problems from stored cars (or any other inconveniences caused by the presence of private cars) can be reflected in price; for example, there should be nothing to prevent a railroad from charging a storage fee to customers who leave cars on its tracks. Price is particularly relevant to a carrier's uncertainty about how many private cars it should have on its system. Instead of granting or denying OT-5, a carrier need only adjust the price it offers for private cars in accord with the market and its own judgment of its requirements. Price adjustment is, in fact, a better response than a "yes" or "no" to private cars. The railroad that changes the price it offers for cars as market conditions change should do better than the railroad that holds to a fixed price and uses OT-5 acceptance or denial to control private cars. The latter carrier will miss opportunities that the former will be able to exploit.

While it may be clear that offering market-responsive prices for private cars would be better for a carrier than holding to a fixed rate, some observers are concerned that railroads

would be in a vulnerable position in slack-demand times if they were deprived of the right to deny OT-5. The essence of this concern is that, if private-car holders found themselves unable to generate revenue from their cars, they would take any price from a railroad, no matter how low. The railroad, unable to refuse, would be compelled to accept the private cars and take its own cars out of service, thereby losing revenue from its cars that it would otherwise have realized.

If, however, the railroad is free to lower its allowance below the variable cost of using its own cars, it would profit from a private-car holder's willingness to accept such a price. The railroad might, indeed, take its own cars out of service in this situation (if it could find no other employment for them). The carrier would, however, be making more money from using the customer's cars than from using its own cars, because of the willingness of the customer to supply cars for less than it would cost the railroad to use its own equipment. In this scenario, the railroad is gaining at the expense of the private-car holder, not the other way around. If, on the other hand, the railroad offers an allowance above its own variable cost, it does so because it finds at least some value in the use of a customer's cars.

During the car-surplus period of the early to middle 1980s, both railroads and private-car holders had idle cars on their hands during some summers. Short-term lease rates fell as low as $90 a month (which, according to many observers, approximates variable cost). In individual transactions, grain merchandisers holding cars sometimes paid premiums for grain so high that the effective price for the cars was zero. Whether such conditions are likely to recur is open to debate; certainly, no one can guarantee that they will not.

However, for the last several years, definitely since 1988, short-term lease rates have stayed above $300 per month, even in the summer doldrums (Figure II-10). There is a fairly broad and active market in which leased cars change hands on a sub-lease basis. Grain-hauling railroads, a number of merchandisers, non-grain users of covered hoppers, railroads and other market operators in Canada—and sometimes in Mexico—make up most of the market participants. There are thought to be somewhere between six and twelve car-brokerage firms in the country that base their business entirely on arranging trades in leased cars. Many of these firms handle other types of cars as well as covered hoppers, but at least one broker handles only covered hoppers.

Both railroads and merchandisers are continually leasing cars as they seek to adjust their fleets for changing market conditions. Market observers believe that something like 8,000 to 10,000 cars are traded on a sub-lease basis in a single year. Trip leases occasionally occur, but most sub-leases are for anywhere from two months to five years. Short-term leases covering only late-spring to early-fall months definitely occur and generally at rates somewhat above or, as in the summer of 1993, well above, $300. To be sure, the lease market and the day-to-day transactions among merchandisers, railroads, and elevators are somewhat different markets, but they are closely related. If car-holders can get $300 per month in the slack

season, it suggests that the market is not being flooded by operators who expect to get little or no revenue from their cars.[48]

In sum, there has been an active leased-car market in recent years during all seasons. As previously noted, this does not mean that car-surplus periods cannot recur. However, as long as a railroad is free to offer an allowance below the variable cost of using its own cars, it cannot be damaged by accepting private cars at that price—in fact, it gains as compared with using its own cars.

Therefore, we see that the use of flexible, market-responsive pricing of grain cars, rather than acceptance or denial of OT-5, should be a benefit to the railroads. It should also be a benefit to their grain-shipping customers. The principal reason is that pricing allows the customers to make their own decisions about whether or not to use private cars for any given trade. With an arbitrary rule, the railroad has already made that decision for its customers. Even when a railroad, in time of plentiful car-supply, offers very low prices for private cars, some customers may find it to their advantage to use leased cars.

It seems clear that, if railroads abandoned all non-price barriers to the use of private grain-cars, returns to non-railroad investors in grain cars should increase. Confronted by price changes, rather than arbitrary rules, private-car holders should be able to exploit opportunities that are now closed to them. Further, as long as railroads are free to pursue their chosen strategies in pricing for private cars, and those strategies are sound, they should not be worse off than they are under the present arrangements.

EFFECT OF FLEXIBLE RATES ON RAILROADS AND GRAIN TRADERS

An interesting question arises here. We have argued (above at pp. 66-67) that greater grain-rate flexibility for railroads should lead to a higher return on grain cars owned by railroads. We have also argued that eliminating railroads' non-price barriers to private grain cars should lead to a higher return on grain cars owned by non-railroad investors. If both actions were taken, what should be the net result with respect to incentives to invest in grain cars? First, we need to be precise about the changes we are considering:

> *Current Arrangements:* Due to both explicit legal restraints and various implicit restraints, railroads do not increase the rates they charge for moving grain fast enough to keep up in a rapidly rising market; nor are they free to lower the prices they offer for private cars quickly enough in a rapidly falling market. They are, however, free to refuse entry to private-car holders who wish to use their own cars to carry grain.

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[48]The information in these two paragraphs on the leased-car market was gathered in conversations with railroads, grain traders, and people who act as brokers in arranging sub-leases on private cars.

Proposed Arrangements: Railroads should be free to adjust rates for hauling grain and providing cars, and prices offered for private cars (but would continue to be restrained from abusing market power).[49] Further, railroads could not refuse entry to private grain cars; a railroad would have to respond to a shipper's request to use private cars by offering a price for those cars. A railroad could offer a private-car holder whatever price the railroad deemed best in light of market conditions and its own circumstances (if the market so warranted, that price could be zero)—it could not simply refuse private cars.

The effect of these "proposed arrangements" would be to merge two markets that are now separated: the market for railroad-controlled cars and the market for private cars. Existing restraints on railroad pricing and on the use of private cars create two markets; remove those restraints and there is only one market. (It is important to note that this single, open market can only come into being if restraints on both railroads and private-car holders are lifted simultaneously; with open access, railroads *must* be able to adjust rates for movement and cars as freely as grain traders adjust rates for cars.)

The issue of net change in inducement to invest in grain cars depends, thus, on whether the merger of these segregated markets leads to a higher return on grain cars than would otherwise be the case. The answer is that the merged market increases returns, because elimination of the existing market barriers opens opportunities, otherwise closed, to both railroads and grain traders without requiring firms in either group to take on new costs.

It is beyond the scope of this report to explore and resolve all the details about rate setting and rate quoting that are implied by these proposed arrangements. It does seem clear, however, that it would mean a system in which prices for grain movement are agreed to between railroads and their customers at the time the cars are ordered. If, on a given day, a shipper told a railroad he wanted cars three months hence (e.g., the second half of March), the railroad would reply with a rate quote for providing the cars and moving them; if the shipper accepted the price, that would fix an agreement by which both were bound. The rate for grain movement capacity in the second half of March might fluctuate widely in the interim, but that shipper would have a firm commitment from the carrier to place the cars at that time at the rate already fixed.[50]

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[49]Any proposal for increasing rail-rate flexibility raises questions about potential abuse of market power. Existing provisions of the Interstate Commerce Act or, possibly, the antitrust statutes may well suffice for this purpose; however, we have not analyzed the question and cannot firmly state that no adjustment to these provisions would be needed.

[50]These arrangements would give an elevator more protection against rate movement after a sale is made than it has now. Most sales are for loading one or more months ahead, so the current 20-day filing rule on rate increases provides only limited protection.

There are some observers who believe that grain dealers have an inherent competitive edge over railroads in the use of grain cars to the extent that, in a single, open car market, control over cars would inevitably shift from railroads to merchandisers. This belief may be founded, in part, on a perception that grain dealers have opportunities for generating revenue (or reducing costs) with grain cars that are not available to rail carriers. This perception is valid under the current arrangements with segregated markets for railroad and private cars; it becomes invalid when the barriers between these markets are eliminated. As matters now stand, a grain trader can use control of cars to gain bargaining leverage in a period of high demand. Specifically, a trader who holds cars can offer below-market bids for grain to traders who cannot obtain cars; any resulting gain in trading margin is, in effect, a reward for holding cars.

With present rules and rate inflexibility, this reward is not available to a railroad; with flexible rates in an open car market, the railroad would be able to capture this reward with higher prices. Thus, under the current arrangements, grain dealers have an opportunity to capture the premium accruing to cars in high-demand periods, and railroads do not; with a single market for cars, both would have that opportunity.

As far as the system's ability to move grain is concerned, it should not make any difference whether grain cars are owned by railroads or by grain merchants. It is the size of the total fleet, and how well it is utilized, that matters. In this connection, however, some have raised the question of whether railroads are inherently more efficient users of cars, so that a shift in control over cars from railroads to grain traders could result in decreased utilization to the point where system capacity might decline even though the number of cars went up. In the SCOT-5 decision[51], for example, the ICC found that railroads can obtain greater utilization (more loaded trips) from their own cars than they can from private cars[52]; this point is made in support of the proposition that railroads are entitled to a degree of protection in the use of their own cars.

If railroads are, in fact, more efficient users of grain cars, then control of grain cars would shift *towards* railroads, not away from them. In an open car market, ownership and lease holding of cars will tend towards those firms that get the highest returns from cars. Cars will be worth more to such firms, and they will tend to bid the lease rates up to levels that less efficient operators cannot afford. Let us suppose that railroads as a group are far more efficient than grain traders in their use of grain cars, in the sense of more loads per month. If

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[51]ICC Docket No. 39169. *Shippers Committee, OT-5 v. The Ann Arbor Railroad Company, et al.*, 5 ICC 2d 856, September 15, 1989, pp. 872-874.

[52]The ICC based its finding on evidence submitted by BN showing higher cycles per month for BN-controlled cars on BN territory than for private cars. BN's analysis was disputed by grain shippers, but the ICC rejected their criticism. Analytical resolution of this point is outside the scope of this project.

this were so, then car holding would shift from grain traders to railroads, unless grain dealers had some kind of offsetting advantage in getting returns from grain cars other than through loading them. But, in a free car market, the same opportunities should be open to all participating firms.

If a grain trader did have an edge over a railroad, it might be in having a better sense of when and where demand was going to peak and being able to place its cars so as to get maximum advantage from a peak-demand surge. But, in so doing, the grain trader is accommodating the peak and contributing to the efficiency of the system. There does not appear to be any reason why merchandisers' handling of cars would drag down the efficiency of the system. Thus, any increase in investment in grain cars resulting from a shift to an open-market system should result in an increase in grain-movement capacity.

IMPLICATIONS FOR OTHER RAIL INVESTMENT IN CAPACITY

A railroad's capacity to move grain and the level of service it provides depend on other factors as well as the number of covered-hopper cars the railroad controls. Any market participant can buy grain cars and make them available, but only a railroad can furnish locomotives and crews, provide and maintain signal and communications gear, and maintain track, switches, and so forth. Railroad spending for these things, as well as decisions on the resources to be allocated to grain service, will be influenced by earnings from carrying grain.

With respect to some rail assets, particularly for signals and communications and for track maintenance, earnings from grain will affect investment only in that they affect the railroad's overall earnings. However, with respect to power and crews, earnings from grain relative to earnings from other commodities the railroad carries become quite important. At any given time, a fixed number of locomotives and crews is available to the rail carrier and the question of how to allocate these resources among various classes of traffic must always be addressed. Traffic that has lower earnings compared with other markets will inevitably receive lower priority as these allocation decisions are made.

Further, some track is used largely for grain service, and the level of maintenance must be influenced by earnings from grain. Also, railroads have a number of uses for covered hoppers besides carrying grain. Most, if not all, free-flowing, dry, bulk commodities can be carried in a covered hopper, and many of them require protection from the weather just as grain does; examples are fertilizers, feed, plastic pellets, and soda ash. If grain generates low earnings compared with other traffic using C-113s, it is going to rank low in the priority for car allocation.

There is no escaping the fact that the level of service a railroad can supply to its grain-shipping customers (or any other customers) depends directly on the earnings from serving them and how those earnings compare with returns from serving other groups of customers. Restraint on rail rate flexibility can only restrict the level of service that grain customers get from railroads. Removal of these restraints would do more than yield an increase in grain-

moving capacity; it would also allow market-based allocation of that capacity in periods of high demand. While the capacity increase, in and of itself, will not eliminate car shortages, the advent of market-based allocation (i.e., flexibility) would do so.

IMPLICATIONS FOR THE COMMON-CARRIER OBLIGATION

When considering the consequences of a freer market for grain cars and grain movement, the railroads' common-carrier obligation is an issue of concern. This is a major theme in the SCOT-5 decision—the Commission is concerned that the free entry of private grain cars would cause railroads' car fleets to decline, thus impairing their ability to meet their common-carrier obligations. More broadly, the common-carrier issue is almost always raised in debate about reducing regulatory restraint on railroads, usually in the sense that relaxing some restraint might allow rail carriers to ignore, or escape from, their duties as common carriers. Therefore, we have to analyze the impact on the common-carrier obligation of the "proposed arrangements" we are considering here.

The first step in this analysis is to discover the meaning of "common-carrier obligation." In its recent remand to the ICC regarding the Commission's ruling on the legality of BN COTs,[53] the U.S. Court of Appeals called attention to Sections 11101(a) and 11121(a)(1) of the Interstate Commerce Act. The former says that common carriers must provide "transportation or service on reasonable request"; the latter says that rail carriers shall provide "adequate car service" and have "reasonable rules and practices on car service." While implicitly conceding the generality of this language, the court went somewhat further and found a Congressional intent that cars should be distributed equitably among customers requesting tariff service and that a carrier should have sufficient equipment to meet "reasonable" requests for conventional service.

With regard to the proposed arrangements considered here—rate flexibility for railroads with regard to grain movement and grain cars and an open market for all grain cars—there are two important points already established:

- A rail firm's financial ability to provide grain service would not be damaged; indeed, it would be enhanced, and higher earnings from moving grain would draw more resources into rail grain operations.

- It would be unlikely that railroads would cease to own grain cars or hold them on lease; there is no obvious reason that would lead one to expect that grain traders would have an inherent ability to generate more earnings from grain cars than railroads can.

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[53]United States Court of Appeals for the Eighth Circuit, *National Grain and Feed Association v. United States*, 5 F. 3d 306 (8th Cir. 1993).

Nonetheless, control of cars *might* shift, to some degree, from railroads towards grain houses. We have no basis for holding that to be impossible; but that shift would not diminish availability of cars to customers. Regardless of what firms held them, there would be more cars than otherwise. And whoever controlled the cars, whether railroad or grain trader, would be under strong pressure to keep them utilized. Again, the cars are fixed-cost assets; owners or lessees will try to use them to the fullest. Control over cars would not shift from railroads towards grain houses unless grain traders were successful in using cars to accommodate many shippers.

After all, the reason that grain gets shipped is not that the government orders the railroads to move it. The fundamental reason that grain gets shipped is that it can be sold for a price high enough to cover the cost of production and transportation. These market conditions will make sure that cars are available to shippers and grain moves. Shippers will get service, at market prices, regardless of who controls the cars. (There are highly efficient rail markets—chemicals is a good example—in which virtually all cars are held by shippers and railroads provide only the service of haulage.)

It is difficult, if not impossible, to give analytical meaning to the phrase, "adequate car service." It can be said that, with an open car market, shippers would get better car service in a peak-demand period than they do now; and this would be true for shippers who do not wish to hold their own cars as well as for those who do. The open car market with rate freedom for railroads would give the small shipper choices and flexibility that do not exist now. (And it should be noted that the option of holding cars is not necessarily closed to small shippers; in the 1970s, some elevators formed associations to hold grain cars; with the advent of the car-surplus period of the early and middle 1980s, these groups became defunct.)

Under current arrangements, an elevator on a railroad with non-market allocation has very limited choices in a car-shortage period. Generally speaking, the elevator either receives a fixed allocation based on historical usage or essentially holds a lottery ticket. In the latter case, the elevator manager faces uncertainty; he does not know when he will get cars from the railroad.

Suppose such an elevator is nearly full. The manager's choices will probably be: (1) selling to a merchandiser who has cars and will insist on a steep discount off his cash bid; or (2) holding on in the hope that cars may turn up in three or four weeks. But he does not know when cars will come from the railroad, so he has no way of estimating how long he might have to bear the cost of a full elevator. Under the open-market arrangements, he would have more choices and he would know the cost of them. If the railroad is charging market-clearing prices, it will have cars available, albeit at high rates in a high-demand time. Several merchandisers may also have cars available, and the elevator manager should be able to discover the market price of cars. In an open market, with more competition than under the present arrangements, the elevator will likely not have to pay a merchandiser as much for cars as it would now.

Importantly, the open-market arrangements allow the choice of postponing shipment for a few weeks if the elevator manager finds that day's opportunities unattractive. He will not, of course, know for certain what the price of cars might be in two or three weeks (or what the price of grain will be), but cars can be obtained at some price if he decides to wait. He has the choice of shipping now or later, and he has information to help calculate the gains and costs associated with his decision.

The elevator receiving a fixed allocation based on past usage is in a somewhat different position. That manager knows when he is going to get cars and how many; but he has no effective way of signalling to the market about the special opportunities, or threats, that might make it highly desirable for him to ship on some pattern quite different from his historical usage. A feature, possibly the worst feature, of any non-market allocation system is that it takes little or no account of which grain traders can realize the highest value by shipping at a peak-demand time. All elevators are treated alike, or on a historical basis, regardless of the relative economic merits of the opportunities before them.

If we define "reasonable request" as "request from a customer willing to pay market price for service," and we define "adequate car service" as "cars provided to customers willing to pay market price," then the proposed arrangements satisfy those requirements of the common-carrier obligation.

It remains to consider whether the open-market arrangements satisfy a requirement for equitable distribution. "Equity" is, of course, difficult to define. It does seem clear, however, that equitable distribution of grain cars is often used to mean allocation of cars among customers on some basis other than market signals. More generally, proposals for equitable distribution are introduced when some people believe that something unfair or unjust in the allocation would result from the workings of the market. In the context of the grain market, equitable distribution is often used in the same sense referred to above: all elevators should be entitled to get some cars, allocated in some arbitrary fashion, regardless of their circumstances or their willingness to pay a market price. The proposed arrangements do not satisfy this meaning of equitable distribution. But this concept reflects equity only in that all are treated alike when, in fact, all are different.

If we define equity as allocation of cars to those willing to pay the market price, then, of course, the proposed arrangements meet the common-carrier test. And we would argue that, as long as prices do not reflect abuse of market power, this is a sound definition of equity. A market allocation system distributes cars and service to those who can make the best economic use of them, those merchandisers or elevators that have the most profitable trading opportunities (or that face the greatest threats of loss). The sellers whose business situations make them the most anxious to sell and the buyers whose circumstances make them the most anxious to buy are the ones who will get cars in a high-demand period. All market participants can look at the same price information and make their own decisions as to whether to buy transportation at high prices or postpone shipment in the hope that market conditions will change in a favorable way.

To force non-market allocation on the system in the name of equity, which is something like what we now have, is to reduce the efficiency of the grain-marketing system and, thereby, to reduce the incomes of many of its participants, including farmers. It is relevant to consider what interests are being protected when law and custom impose a non-economic allocation system for transport services and cars. Railroads and merchandisers are clearly not being protected by the present system; both would benefit from moving to a market-based system.

It appears that the only possible beneficiaries of the current system are elevators that may have higher costs than their rivals or whose management may lack the sophistication necessary to operate in a dynamic transportation market. (Recall, however, from Chapter II that many elevators can find ways to get assistance with these matters; also, many grain elevator operations have highly sophisticated management.) It is outside the scope of this project to consider whether it is desirable public policy to protect less efficient elevators at the expense of their more capable rivals.

We note, however, that this non-market allocation also comes at the expense of farmers. The effect of the non-market system is to prevent the more efficient elevators from fully exploiting their advantages over less efficient ones; and some of the gains from efficient elevator operations would be passed on to farmers in the form of higher bids (or higher refunds).

We conclude that insistence on non-market distribution of grain cars in the name of equity and the common-carrier obligation is economically damaging to the grain production and distribution system and most of its participants. If the ICC and the courts continue to interpret the common-carrier obligation to require a non-market allocation system, it would be wise public policy to consider substantial modification of the common carrier obligation.

SECTION E—SUMMARY

Decline in the covered-hopper fleet has bottomed out, new grain cars are being added, but the fleet is definitely not increasing strongly. The precipitous collapse in exports in the early 1980s was the largest single factor in causing the downtrend; changes in federal tax policy also played a role. The fleet surplus has been worked off and railroads are buying some C-113s, although private owners have not ordered any cars since 1980.

Government actions involving sale or repositioning of CCC stocks of grain were a problem in the past, putting extra demand on the system in peak periods. The CCC's stocks of grain are all but gone and no longer pose a problem. The effect of future Corps of Engineers investment in capacity on the Mississippi River (or the lack of such investment) is likely to influence the demand for rail grain shipment; lack of investment could encourage rail capacity expansion if it pushes up earnings. Nonetheless, there would be little effect on peak-period car allocation, because the relationship between rail capacity and peak demand would not change in any essential way.

Railroads can and do make arrangements with their grain customers that will enhance capacity through improved utilization (and through increased earnings due to improved efficiency). Examples noted include dedicated-train arrangements and BN's recent initiatives for incentive payments for timely dispatch. Also, C-113s delivered to railroads since 1989 have been upgraded and can carry net loads of 110 tons (up from 100 tons). All these changes will definitely lead to greater capacity and efficiency in the grain trade.

Railroad earnings from grain service are, of course, a critical factor driving railroad investment in capacity to carry grain and the allocation of railroad resources to grain service. Earnings of private-car holders are also a critical factor influencing the total level of investment in grain equipment. Institutional arrangements, embodied in the SCOT-5 decision, intended to enhance railroad earnings from cars by restricting private-car entry are counter-productive for capacity, because they inhibit investment in private cars. Institutional restraints on rail rate flexibility reduce not just rail earnings from grain-car investments but overall railroad earnings from grain service. Institutional restraints on rail rates and on private-car holders are almost certainly holding down rail grain capacity and the level of service, as well as causing inefficient allocation of grain cars in peak-demand times.

APPENDIX

COUNTRY ELEVATORS, MERCHANDISERS, AND RAILROADS WHOSE STAFF MEMBERS CONTRIBUTED TO THE STUDY

COUNTRY ELEVATORS

New Cooperative, Fort Dodge, Iowa
Heart of Iowa Cooperative, Roland, Iowa
Farmers Cooperative Society, Wesley, Iowa
White Cloud Grain, Hiawatha, Kansas
Atchison County Cooperative, Atchison, Kansas
Thompson Farmers Cooperative, Thompson, North Dakota
U.S. Commission, Upper Sandusky, Ohio
Country Star, Bucyrus, Ohio

MERCHANDISERS

Cargill
Continental Grain
Conagra, Inc.
Ag Processing, Inc.[1]
Garvey Grain, Inc.[1]
Benson-Quinn Company

RAILROADS

Burlington Northern
Union Pacific
Atchison, Topeka, and Santa Fe
Chicago and Northwestern
The Soo Line
Chicago, Central, and Pacific
Conrail
CSX Transportation
Norfolk Southern

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[1]Although these firms are merchandisers, discussions with them also covered elevator operations in, respectively, North Dakota and Kansas.

*U.S. G.P.O.:1994-301-717:80585