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**Federal Railroad
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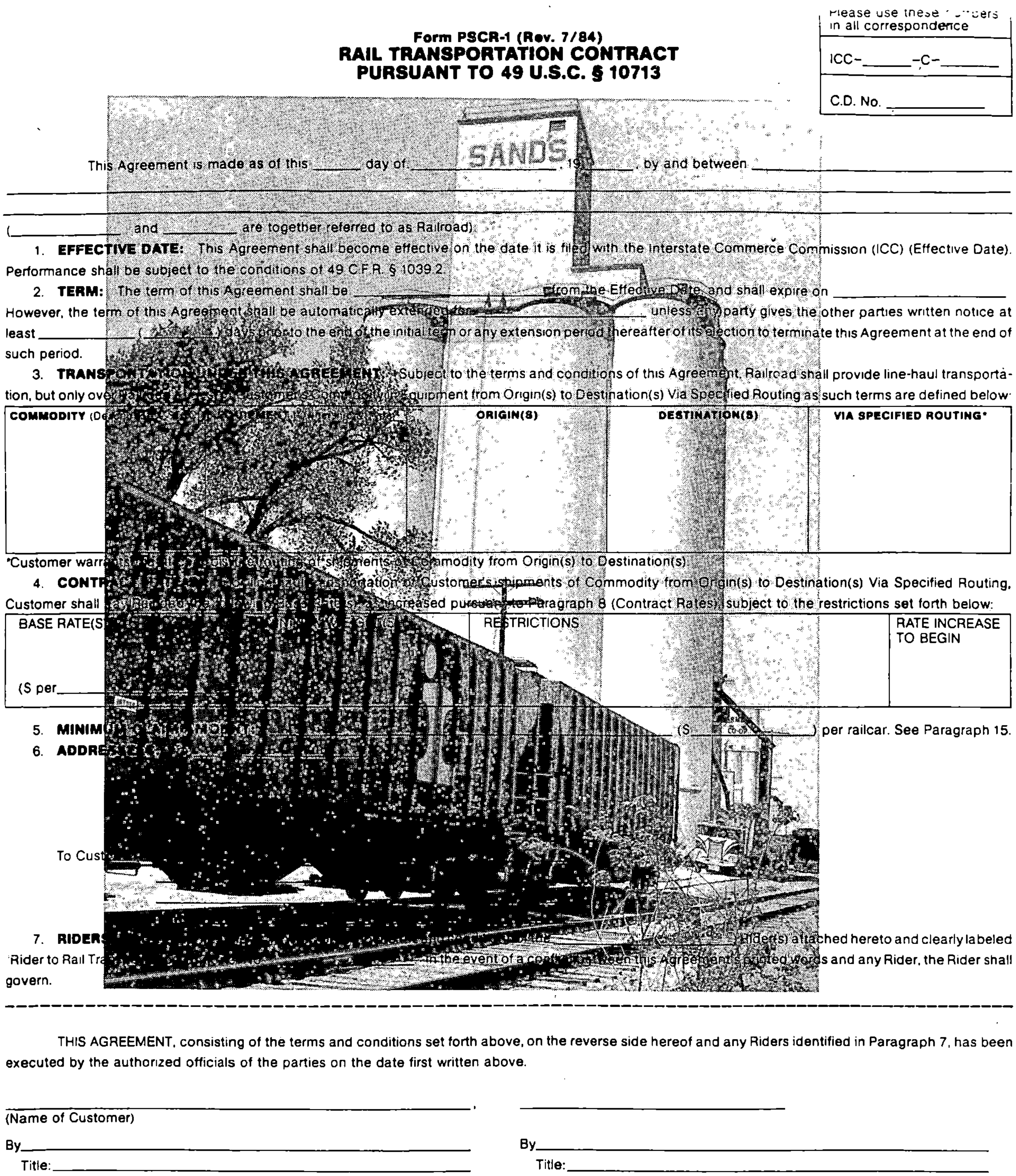
Impact of Railroad Contracts on Corn, Wheat and Soybean Bids to Elevators and Farmers



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This report presents the results of research conducted to determine the impact of destination and origin railroad contracts on grain bids to elevators and farmers. The impact of destination contracts on grain bid prices to elevators was estimated by comparing bid prices for rail delivered grain at markets with destination contracts with truck delivered bid prices at the same market or at alternative markets. The impact of destination and origin contracts on grain bid prices to farmers was estimated by a series of linear regressions which regressed grain bid prices to farmers on contract-free bids to elevators, mileage and carpool allowances on elevator-owned or leased cars, destination contract premiums, the existence of origin contracts, elevator utilization, the number of competing elevators located within 20 miles of the responding elevators and years. Separate analyses were made for corn-soybean areas in Iowa, Nebraska, South Dakota and Minnesota, for southern wheat producing areas in Kansas and Oklahoma and for northern wheat producing areas in North Dakota, South Dakota and Minnesota.

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IMPACT OF RAILROAD CONTRACTS ON CORN, WHEAT, AND SOYBEAN BIDS TO ELEVATORS AND FARMERS

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Chapter I

SUMMARY AND CONCLUSIONS

The purpose of this study is to estimate the impact that lower freight rates established through railroad contracts have had on grain bids to elevators and farmers. Data on grain price bids to elevators and prices bid by these elevators to farmers were collected for 1983-85 from a sample of country elevators in selected counties in the:

1. western corn-soybean producing areas of Nebraska, Iowa, South Dakota, and Minnesota
2. southern wheat producing areas of Kansas and Oklahoma
3. northern wheat producing areas of North Dakota, South Dakota and Minnesota.

The only elevators included in the study were those that buy grain directly from farmers although some sample elevators may also buy grain from other elevators. Terminal elevators that buy only from other elevators were excluded from this analysis, since one of the major purposes of the study was to estimate the impact of railroad contracts on grain bids to farmers.

The collected bid prices were grain bids offered to the sampled elevators and bids offered by the sampled elevators to farmers for grain. These bids are not necessarily prices that grain traded for, but they were firm offers to purchase grain. Bids to elevators for truck-delivered corn, wheat, and soybeans were also collected from U.S. Department of Agriculture (USDA) reports, grain exchanges, exporters, domestic processors, feed lot buyers, and grain brokers. Railroad companies provided data on markets

where destination contract rates existed for the dates these markets offered the highest bids to country elevators in the study. Destination contracts are defined as agreements between railroads and grain buyers--typically grain exporters, grain processors, and brokers--that specify the transportation terms of grain shipments covered by the agreement. Origin contracts are agreements between railroad companies and elevator firms that originate grain shipments and contain essentially the same type of transportation terms that are specified in destination contracts.

The impact of destination contracts on bids to elevators was estimated by comparing bid prices for rail-delivered grain at markets with destination contracts with truck-delivered grain bid prices at the same market or at alternative markets. Truck-delivered bids were used to estimate contract-free rail bids that would be available to the sample elevators. The impact of origin and destination contracts on prices bid to farmers by the sample elevators was estimated by a series of equations which regressed grain bids to farmers on the estimated net contract-free grain bids to elevators, mileage and carpool allowances on rail cars leased or owned by the sampled elevators, destination contract bid premiums, existence of origin contracts, elevator utilization, the number of competing elevators that ship larger size rail shipments and are located within 20 miles of the sampled elevators, and differences among study years.

The results of this analysis are:

- Corn
  - The estimated average destination rail contract bid premium over contract-free bids for corn to the responding elevators was 3.6

cents per bushel. The destination contract bid premiums for corn at individual markets reported by the responding elevators ranged from 8.6 cents per bushel at Dubuque, Iowa, to 0.8 cents per bushel at Savage, Minnesota.

- About 72 percent of the destination contract premiums was passed on by the elevators in the form of higher bids for corn to farmers.
- Origin contracts had no direct statistically significant impact on bids to farmers for corn. Some elevators with origin contracts use them primarily as a bargaining tool to obtain higher prices for destination contracts. Thus, the benefits of origin contracts on corn bids to farmers may be captured through the destination contract bid premium.
- Additional income to farmers from contracts in one four-county area in Iowa included in the study was estimated to be about $1.1 million, or $238 per farm in 1985.

● Soybeans

- The estimated average destination rail contract premium over truck bids for soybeans to the responding elevators was almost 2.9 cents per bushel. The destination contract bid premiums for soybeans at individual markets reported by the responding elevators ranged from 9.7 cents per bushel at St. Louis to 0.3 cents at Chicago.
- About 32 percent of the estimated soybean destination contract bid premiums was passed on by the elevators in the form of higher bids to farmers for soybeans.

- Origin contracts had no statistically significant impact on bids to farmers for soybeans.
- Additional income to farmers from contracts in one four-county area in Iowa included in the study was estimated to be about $131,000 or about $28 per farm in 1985.

● Southern wheat

- The estimated average destination contract bid premium over contract-free bids to elevators for Kansas and Oklahoma wheat was 1.0 cent per bushel. This is sharply lower than the destination contract bid premiums on corn and soybeans. Destination contracts had no significant impact on wheat bids to farmers.
- Origin contracts between railroads and grain elevators added an estimated 19.75 cents per bushel to wheat bids to farmers. This impact was much more dramatic than for the other types of contracts included in the analysis.
- Additional income from origin contracts to farmers in one four-county study area included in the study was estimated to be about $5.3 million, or over $2,300 per farm in 1985.

● Northern wheat

- The average destination contract bid premium for wheat over the three-year period was only 0.5 cents per bushel. There were no destination contracts at the markets from which the responding elevators reported bids in 1983.
- No responding country elevators in the selected study areas reported origin contracts during the three-year period.

- While railroad contracts had little or no impact on wheat bids to elevators in the northern wheat study areas studied, the cooperating railroad reported numerous destination contracts, particularly to export ports, and several origin contracts with elevators located in counties outside the study areas in North Dakota, South Dakota, and Minnesota. Thus, we cannot conclude that contracts had no impact on wheat bids to elevators and farmers in these states. Rather, we conclude only that railroad contracts had no impact on bids to elevators and farmers in the selected study areas.

- Overall impact on grain bids
  - The impacts of destination contracts on grain bids to elevators and of origin contracts on bids to farmers varied widely among the three regions and crops included in this analysis. This suggests that the overall impact of railroad contracts on grain prices vary by type of grain, production region, and type of contract.
  - In most cases, destination contracts were used more often than origin contracts. Destination contracts affect grain bids to elevators. However, origin contracts can be used as a tool to negotiate a higher bid from destination contracts. Both destination and origin contracts affected grain bids to farmers. Less than 45 percent of the responding corn-soybean elevators and 28 percent of the responding wheat elevators had origin contracts.

- Impact on elevator competitive positions
  - No data were collected in this study on the impact of railroad contracts on grain flows from farmers to elevators. However, the relatively large estimated impacts of destination contracts on corn bids and corn income to farmers and the very large impact of origin contracts on wheat bids and wheat income to farmers in Kansas and Oklahoma undoubtedly have resulted in many farmers in these areas searching out higher grain bids in an effort to increase their net farm income. As farmers search out and sell their grain to country elevators offering higher bids to farmers, the bypassed elevators may be forced either to meet contracting competitors' prices and thus operate at lower handling margins, or to allow the grain to flow to the elevators with higher grain bids.

Chapter II

INTRODUCTION

The Staggers Rail Act of 1980 (SRA) provides railroad companies with significantly more rate freedom than was possible for nearly a century. A major rate freedom granted to railroad companies is the right to contract with shippers and receivers for a wide range of transportation terms including rates, size of shipment, minimum volume, car supply, and other services. While railroad contracting rules were first established by the Interstate Commerce Commission (ICC) in November 1978 [7], the SRA formally legalized contracts in 1980. Contract filings between railroad companies and shippers and receivers, shown in table 1, began slowly. Only 76 contract proposals were filed before passage of SRA. Over 47,000 railroad contracts were filed between October 1980 and December 31, 1986, with 91 percent of that total filed after January 1, 1983 [9]. Thus, railroad companies and shippers and receivers used the first two years following the passage of SRA to learn how to use contracts.

Contracts on grain and grain products followed a similar pattern. Almost 95 percent of all railroad contracts on grain and grain products were filed between January 1, 1983 and December 31, 1986 [9]. Grain and grain product contracts as a percent of total contracts increased over time to a high of 22.8 percent in 1985. The Association of American Railroads estimates that 63 percent of all grain moving by rail in 1986 was transported under contract [9]. Thus, contracts have become the dominant method of specifying railroad rates and services on railroad movements of grain and grain products.

Table 1. Total railroad contract filings with the Interstate Commerce Commission and percent of total contracts on grain and grain products, November 1978 - December 1986.

Time period	Total number of contract filings	Total number of contract filings on grain and grain products	Percent of total contracts filed on grain and grain products
Nov. 1978 - Oct. 1980	76	NA	NA
Oct. 1980 - Dec. 1981	768	[1,344*]	[10.9*]
Jan. 1982 - Dec. 1982	3,248		
Jan. 1983 - Dec. 1983	8,285		
Jan. 1984 - Dec. 1984	7,570	1,217	16.1
Jan. 1985 - Dec. 1985	12,169	2,770	22.8
Jan. 1986 - Dec. 1986	15,214	2,935	19.3
Total	47,330	8,266**	17.5**

Source: [9]

*Number of grain and grain products contract filings are for the October 1980 - December 1983 period.

**Excludes November 1978-October 1980.

Functions and Structure of the Grain Industry

The major functions of the U.S. grain industry are to assemble grain from farmers, combine it into lots of uniform quality, provide storage until the commodity is needed by final users and transport it by the most cost-efficient means to the final market destination. Grain prices are influenced by a wide range of variables, including global weather and economic conditions, currency exchange rates, and trade policies. Grain prices can fluctuate substantially in short periods of time. Thus, the U.S. grain industry typically seeks to minimize price risks by hedging grain in the futures market. Grain bids offered by exporters and domestic processors

to elevators are quoted as "basis bids," in cents per bushel over or under futures contract prices. Prices paid to farmers are typically quoted in cents per bushel of grain.

Grain is an easily transportable commodity, and is bought and sold in a highly competitive industry where profit margins per unit are small. Farmers typically sell and deliver grain to local elevators for a cash price. Farmer decisions on where to sell their grain are sometimes based simply on selling to the closest elevator or to the elevator where they have always sold their grain. Since the middle 1960s, however, farmers have increasingly searched for bids at competing elevators located up to 40 or more miles away. These farmers subtract the cost of delivering the grain to various elevators from the bid price at each elevator and then deliver to the elevator where they receive the highest net bid. This means that, increasingly, farmers bypass nearby elevators if they can obtain a higher net price at a distant elevator.

After buying grain from farmers, the elevator manager, like many farmers, also decides when and where to sell the grain to processors or exporters based almost entirely on the highest available net bid. Typically, elevators will switch shipments from one destination to another for a fraction of a cent per bushel. In this highly competitive setting, participants are almost certain to quickly adopt innovations in technology, services and transportation. Gains which accrue to an innovator through cost-reducing procedures soon become apparent to competing firms through changing prices and a shift of grain away from their firm to the innovator. This, in turn, forces neighboring firms to adopt the innovation or accept a

declining volume of business. With an industry composed of a large number of relatively small firms, such as the U.S. elevator business, economic principles suggest that a significant part of cost savings from developments such as rail freight contracts would quickly be passed through the system and would be reflected in higher cash prices bid to farmers. This is the major hypothesis tested in this study.

The structure of the grain industry varies among regions. The spring wheat-producing region is located in the Dakotas and western Minnesota. Major market destinations for spring wheat are millers in Minneapolis/St. Paul and export elevators on the West Coast and Duluth/Superior. The hard red winter wheat-producing region is located in the southern Great Plains states of Kansas, Oklahoma, Texas, and Colorado. The major export markets for hard red winter wheat are at Texas Gulf export ports. The major domestic markets are at milling centers in Kansas City and Omaha. In recent years, a significant amount of hard red winter wheat has been used in local cattle feedlots during the harvest season.

Much of the wheat transported by railroads moves under transit rates. Transit rates allow the grain to be stopped at an intermediate location, unloaded for storage or milling, and then reloaded and transported to the final destination. The cost of this "transit" privilege is implicitly included in the published transit rates.

The leading corn- and soybean-producing states are Iowa, Illinois, Nebraska, Minnesota and Indiana. Production density per square mile in these states is much greater than in the wheat belt. Major market destinations for corn from the western corn belt include processing centers

and river terminals in eastern Iowa and central Illinois, and export elevators at the Gulf of Mexico, and the Pacific Northwest. In addition, sizable volumes of corn are shipped from the cornbelt to commercial feedlots in the Southwest, with this demand varying seasonally and from year to year. Broiler producers in Arkansas are an outlet for U.S. corn at times. Major soybean export outlets are the same as for corn, although the soybean processing industry is more dispersed, with numerous processing plants located in Iowa, Illinois, southern Minnesota, northern Missouri, and eastern Nebraska. Most corn and soybeans transported by railroads moves on point-to-point rates that do not include transit privileges.

Contract Disclosure Rules

The SRA requires the disclosure of the essential terms of all contracts. In Ex Parte 387, the ICC defined the essential terms and established rules for the disclosure of this information to the shipping public [9]. These rules require a summary of the terms of each contract to be made available to the public. However, these summary data do not include the rates under which the traffic is transported. Thus, it is not possible to determine the actual contract rates or to directly estimate the impact of the contracts on grain bids to elevators and farmers. However, it should be possible to compare grain bids made under railroad contracts with grain bids that are generally free of railroad contracts in order to estimate the impact of contracts on grain bids to elevators and farmers.

Objectives

The basic purpose of this study is to estimate the impact of railroad contracts on corn, wheat, and soybean cash bids to elevators and farmers in

selected study areas in several major corn, wheat, and soybean-producing states west of the Mississippi River. The specific objectives were to:

1. select multicounty study areas in Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, and Oklahoma.
2. select a random sample of elevators with access to rail service in each study area.
3. collect grain prices bid to the sampled elevators and grain prices bid from the sampled elevators to farmers in 1983, 1984, and 1985.
4. ascertain the availability of railroad contracts at each sampled elevator for each destination market for which corn, wheat, and soybean bids were provided by the sampled elevators.
5. estimate the impact of railroad contracts on the corn, wheat, and soybean bids to elevators and farmers.

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The attached study was conducted by Dr. C. Phillip Baumel, et al., at Iowa State University, under the sponsorship of the Federal Railroad Administration's Office of Economic Analysis.

Using 1983-85 sample data, Baumel found substantial benefits for farmers and elevators from rail grain contracting. For the Kansas and Oklahoma study area, the bids farmers received for wheat were an average of 19.75¢/bushel higher at elevators with rail "origin" contracts than at elevators without rail contracts. For grain originating in the Western Corn Belt, elevators received an additional 3.6¢/bushel for corn and 2.9¢/bushel for soybeans moved under "destination" contracts with grain exporters and processors.

Attachment

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Chapter III

LITERATURE REVIEW

Most of the literature on the impact of railroad deregulation on agriculture focuses on the overall effects of SRA. Two types of analyses have been published. The first type hypothesizes the potential impacts of SRA on grain shippers, receivers, and producers. A group of papers in a series entitled "Transportation Deregulation and Agriculture," written shortly after the passage of SRA, describes the Act and identifies numerous potential impacts and policy issues likely to result from the Act [21]. Breimyer, in an anti-deregulation paper, severely criticizes several features of SRA, including contract confidentiality and cancellation of joint-line rates [2]. He further states:

> The Staggers Act puts on shippers the burden of protest of carriers actions . . . This feature is deplored as favorable to the biggest shippers . . . and amounting to feudal bondage for smaller ones [p. 664].

Sorenson hypothesized several impacts of SRA on grain shippers, including lower rates, improved operating efficiencies, rate instability accompanied by new risk and uncertainty, significant advantages to larger shippers over small shippers, integration of small shippers into larger firms to gain access to contract rates, reduced interline rail shipments, and shipper encouragement of railroad consolidation [15]. A more complete summary of other analyses of potential impacts of SRA on agriculture has been prepared by Casavant [3].

The second type of analysis of SRA attempts to measure the impact of SRA on agriculture. A group of land grant university transportation

specialists brought together by the Office of Transportation (OT) of the USDA found substantial rail rate reductions and rate innovations on grain shipments since the passage of SRA [12]. The analysis, along with a follow-up assessment by the USDA, found shippers were concerned about joint and through rates, reciprocal switching, contract confidentiality, market dominance, and notification of rate changes.

The first detailed study of the impact of SRA on grain shipments was conducted on Kansas wheat [11]. Klindworth, Sorenson, Babcock, and Chow found:

> Rail rate reductions appear to be responses to market conditions created by many events including reduced export flow of wheat, surpluses of transportation equipment, changes in transport technology and cost relationships and others. Deregulation did not create these conditions but it has contributed to a market environment that adjusts more quickly to those changes than in the past . . . Wheat price spreads have accrued to farmers or to consumers in the United States or to both. Relative benefits accruing to the various groups can only be hypothesized [pp. iii and iv].

This study, funded by OT-USDA, analyzed 127 railroad contracts on wheat shipments within and from Kansas during 1981-1983. It also compared the average tariff rates to contract rates on shipments from Kansas origins to Gulf of Mexico export ports. The study inferred but did not measure the impact of the contract rates on bids to elevators and farmers.

Chow and Sorenson estimated profit maximizing joint rates for export wheat for a case study area and compared actual rates before and after SRA [4]. The actual rates exceeded the estimated rate bureau determined rates prior to SRA and fell below the estimated rate bureau determined rates after SRA.

Adam and Anderson collected weekly corn bids from 20 Nebraska elevators and soybean bids from 14 Nebraska elevators for a six-year period [1]. They related selected elevator characteristics to the level of elevator bids. Their study concluded that origin contracts increased soybean bids to farmers by 12 cents per bushel, but did not affect corn bids. The Adam-Anderson study is the first attempt to measure the impact of railroad contracts on elevator grain bids to farmers. The study does not deal with the impact of destination contracts on grain bids to elevators and the share of the rate reductions, if any, passed on to farmers.

Sarwar and Anderson estimated the impact of the SRA on the variability and uncertainty in corn prices bid to farmers by elevators [14]. They found no significant differences in the variability or uncertainty of corn prices bid to farmers before and after SRA.

The General Accounting Office (GAO), in response to a congressional request, reviewed the methods that the USDA uses to ship government grain by rail [20]. The GAO found that:

> Although the ASCS (Agricultural Stabilization and Conservation Service) negotiated for rate and service concessions on about 10 percent of its 1985 rail grain shipments, . . . its negotiation activities have lagged considerably behind those of other shippers. Consequently, ASCS may have missed opportunities for potentially substantial cost savings [p. 2].

The Interstate Commerce Commission, in its report to Congress on the impact of contract rates on grain shippers, found that large shippers, grain receivers, and farmers have generally benefited from railroad contracts, but some small country elevators have been disadvantaged [8]. However, this study did not attempt to estimate the amount of the benefits that shippers and farmers received from contracts.

Chapter IV

METHOD OF ANALYSIS

The confidentiality of railroad contracts limits access to the rate information in contracts to the contracting railroad, the contracting grain firm, and the ICC. Thus, researchers and competing grain shippers attempting to estimate the impact of railroad contract rates must develop procedures to circumvent the inaccessibility of direct rate information.

The procedure used in this analysis was to collect data on rail and truck rates and delivered prices bid to a sample of grain elevators for corn, wheat, and soybeans on selected days by export, processor, other elevator, and feedlot buyers. Truck-delivered bid prices offered by buying firms were also collected from the major grain markets for the same days that bid prices were collected from the sampled elevators. When the collected elevator bids were based on rail shipments to markets with rail contracts, the rail-delivered bid prices to the sampled elevators were compared with the truck-delivered bid prices for grain at the same market on the same day. If the rail-delivered bid price to the elevator was greater than the truck-delivered price at the same market, the difference was attributed to railroad contracts. For example, if on a sample day the rail-delivered price for corn at a St. Louis market was $2.00 per bushel with a contract rate and the truck-delivered price was $1.96 per bushel, the difference of four cents per bushel was attributed to railroad contracts. If the truck-delivered bid price was equal to or greater than the rail-delivered bid price, no price benefits were attributed to railroad contracts. Thus, this analysis was based on grain bids offered to elevators

and did not necessarily reflect prices at which grain was actually traded. In most cases, competitive pressures would cause grain to move to markets with the highest net prices.

Fundamental Assumptions

The fundamental assumption in this analysis is that truck-delivered bids are the best proxies for grain bids that are free of railroad contract influences. The logic behind this assumption is:

1. In most areas, truck-delivered grain tends to originate closer to the buying market than rail-delivered grain. The cost structure of railroads tends to make railroads more competitive on long distance movements. The cost structure of trucks tends to make them more competitive for shorter hauls. Thus, distance tends to differentiate the supply areas from which rail- and truck-delivered grain originate.
2. For nearby markets, rail-delivered grain has less market flexibility than truck-delivered grain. Rail-delivered grain tends to be restricted to those markets located on the lines of the railroad serving the originating elevator and to those markets located on railroads with joint rate agreements with the railroad serving the originating elevator. Railroads do not have access to grain shipped by elevators without rail service unless the grain is trucked from the originating elevator to an elevator located on a rail line. Truck-delivered grain, on the other hand, has great market flexibility within the shorter distances that trucks are competitive. For these reasons, buyers of truck grain often are

not forced to compete directly with bids on grain delivered under rail contract.

3. Grain delivered by truck is not subject to railroad contract rate reductions. Therefore, buyers of truck-delivered grain do not have inbound railroad contract rate savings to pass on to sellers.

Sample Selection

This study examined the impact of railroad contracts on grain bids to elevators and farmers in three regions: the northern wheat region states of North Dakota, South Dakota and Minnesota; the southern wheat region states of Kansas and Oklahoma; and the western corn-soybean region states of Nebraska, Iowa, Minnesota and South Dakota.

A sample of 181 elevators was asked to provide information on grain price bids to the elevators and grain prices offered by the elevators to farmers. The sample of elevators was selected in the following manner. Groups of counties were arbitrarily selected from areas that shipped a high percent of their grain by railroad. Railroads operating in the selected counties were then asked to cooperate in the study. The population of elevators was defined as all elevators in the selected counties which had direct access to rail lines of cooperating railroads and bought grain from farmers. If two or more elevators in the selected counties were under common ownership, such as a cooperative with several branch elevators, these elevators were treated as a single entity because they generally operate under a common bidding system. Three types of elevators excluded from the population were those located on railroad lines not included in the study, those without rail service and those buying grain only from other elevators.

Generally, these railroads and elevators handle smaller quantities of grain than the railroads and elevators included in the population. Thus, the elevators included in the population are believed to handle the majority of the grain in the study areas.

From this population of 333 elevators, a sample size of 175 elevators was determined to be a statistically efficient sample size. Allocating an initial sample of 175 elevators to the three regions in proportion to the number of elevators contained in each region would have resulted in samples of 44 in the northern wheat region, 48 in the southern wheat region, and 83 in the corn-soybean region. Since data collected from each region were to be analyzed separately, the proportional allocation was modified slightly by increasing the sample sizes to 50 from each wheat region, and reducing the corn-soybean region sample from 83 to 75 firms. Within each region, the population list of elevators was arranged by the amount of storage capacity of the individual elevators and sampled in an interval manner with the probabilities of selection being proportional to the storage capacities. While larger elevators had a greater probability of being selected, this procedure also assured that some smaller elevators would be selected.

In each region, some elevators had storage capacities larger than the initial systematic sampling interval, thus giving them probabilities of selection greater than one. These elevators were included in the sample with certainty--i.e. with probability equal to one--and removed from the list. A new systematic sampling interval was calculated for the elevators on the reduced population list and the remaining sample elevators were selected. After the sample was drawn, an additional railroad company agreed

to participate in the study and six elevators located on that railroad were added to the sample. Appendix A shows the number of elevators in the population and in the sample by county within each group within region.

Collection of Grain Prices

Price data for corn, wheat, and soybeans were collected from the sampled elevators for every other Thursday for the following time periods:

Year	Wheat	Corn and soybean
1983	April - September	January - March
		October - December
1984	April - September	January - March
		July - September
1985	April - September	April - June
		October - December

These time periods were selected in order to obtain price data during periods of low and high volume rail shipments of corn, soybeans, and wheat.

Sampled elevators in the wheat regions were asked to provide price data only for wheat, while the sampled elevators in the corn-soybean region were asked to provide price data only for corn and soybeans. The following information was obtained:

1. The sample day's bid to farmers
2. The sample day's best bid to the elevator
3. For each bid:
    a. the destination market
    b. the bidding company

c. whether the bid was on a delivered or Free-on-Board (FOB) basis

d. whose rail cars would be used

e. whether the origin elevator had a railroad contract to the destination market

f. whether the bid was based on using the elevator contract

g. the published rail rate

h. whether the rail rate was a transit rate and, if so, the transit location

i. number of rail cars in shipment

j. amount of mileage allowance, if any, the elevator would receive

k. amount of car pool allowance, if any, and whether it was a buyer's or seller's pool

These data were collected for the sampled days in 1983, 1984, and 1985.

Twenty-six sampled elevators should not have been in the sample because they lost their rail service after the source directories were compiled, did not function as a grain buyer, were branch operations of an elevator already in the sample, or did not buy grain from farmers. In addition, eight elevators had gone out of business prior to the data collection. After reducing the sample size by the number of elevators that should not have been in the sample or had gone out of business, the percentages of completed responses were 27 and 33 percent for the wheat sample and 39 and 37 percent for the corn-soybean sample for the 1983-84 and 1985 periods, respectively.

Two additional sets of data were collected for this analysis after all the elevator price data were collected. First, delivered truck bids were collected from the USDA [16], grain buyers, and grain exchanges for the destination markets that the sampled elevators indicated were their best net bids for the sample days during the study period. Secondly, the railroad companies serving the elevators in the sample were asked to indicate whether there were railroad contracts into the destination markets listed by the sampled elevators as having the highest net bids on those days.

The Models

The two basic types of contracts between railroads and grain shippers are destination contracts and origin contracts. Destination contracts are defined as agreements between railroads and grain buyers--typically grain exporters, grain processors, and brokers--that specify the transportation terms of grain shipments covered by the agreement. These terms frequently include, but are not limited to, rates, minimum quantities per shipment, minimum and maximum quantities to be shipped over the life of the contract, geographic areas from which the grain will be shipped, penalties for failure to meet the contract terms, incentive allowances, and whose rail cars will be used in the shipments. Almost all railroad contracts on grain since 1980 have specified rates that are lower than the rates in published tariffs at the time the contract was negotiated. Under destination contracts, the buyer typically pays the freight bill so grain bids to elevators under destination contracts are often on an FOB--loaded but not shipped--basis at the elevator. Elevators receive price premiums from destination contracts

when the destination grain buyer passes a portion of the contract rate savings on to elevators in the form of higher grain bids. Destination contract benefits may also be passed on to elevators through a "trickle down" effect, as other buyers in the same market make sales to the contracting grain buyer and then pass contract benefits on to elevators in the form of higher prices. If the destination market is an intermediate market, a portion of any rail contract rate savings on the outbound shipment may be passed to the elevator in the form of a higher inbound price.

Origin contracts are agreements between railroad companies and elevator firms that originate grain shipments with essentially the same type of transportation terms that are specified in destination contracts. A major difference in the two types of contracts is the manner in which country elevators receive contract benefits. All rate savings from origin contracts go directly to the contracting elevator in the form of lower freight rates. Origin contracts can affect grain bids offered by destination buyers to elevators only if the contracting elevator uses the origin contract as a bargaining tool to negotiate a higher bid price for its grain. Destination contracts, on the other hand, directly affect grain bids to elevators if grain buyers with destination contracts pass part of the contract rate savings to the elevators in the form of higher grain bids.

Grain bids by elevators to farmers can be affected by both origin and destination contracts. Elevators may add a portion of the higher bid prices they receive from destination contracts or a part of the rate savings from using origin contracts on to their bid prices to farmers to attract more grain to their elevators. Thus, bids to elevators can be directly affected

by destination contracts while bids to farmers can be directly affected by both destination and origin contracts.

Estimating destination contract impacts on grain bids to elevators

Assume the bid price for rail delivered grain paid by all buyers at market A is $3.00 per bushel and the published tariff rate is $0.75 per bushel. In theory, the net bid to elevator X should be the delivered bid less the tariff rate, or $2.25 per bushel. This net bid does not include contract rate savings or elevator leased or owned rail car mileage allowances. Assume Company B, buying grain at market A, negotiates a destination contract with a $0.10 rail rate reduction below the published tariff rate. Now, company B may be willing to offer $3.05 per bushel. Thus, the net bid to elevator X is now $3.05 - $0.75 = $2.30. In this case, company B has passed on $0.05 of the $0.10 rate saving to elevator X in the form of a higher bid. However, once company B offers a higher bid, other buyers of rail grain in that market are likely to raise their bids to continue to attract grain. These buyers would either lower their handling margin, negotiate a contract with a railroad, or capture part of the destination contract rate savings by selling grain to competing company B and covering this sale with higher bid purchases from elevators. Thus, a comparison of rail bids offered by company B under destination contract and non-contract rail bids by other companies at the same market would likely yield biased results of the impact of destination contracts on bids to elevators. If the destination market is an intermediate market or transit location, contract influences on the outbound shipment may also affect rail

contract and non-contract inbound bids. Thus, non-contract rail bids were not used as the basis of comparison to estimate railroad contract bid premiums.

The basic measure selected to estimate the impact of destination contracts on bids to elevators in this study was the difference between rail-delivered bids at markets where destination contracts exist and delivered truck bids at the same market on the same day. The precise measurement of the destination contract price bid premium to elevators is:

$$DCP_{jj} = DRB_j - DTB_j \quad (1)$$

where:

DCP_{jj} = destination contract bid premium at market j over the truck bid at market j;

DRB_j = delivered rail bid at the market j;

DTB_j = delivered truck bid at market j.

Equation (1) simply measures the difference between the delivered rail bid and the delivered truck bid at the same market.* Comparing delivered rail and delivered truck bids eliminates the impact of mileage and carpool allowances on shipper or buyer owned or leased rail cars.

The following restriction was placed on equation (1):

$$DCP_{jj} \geq 0.$$

Thus, only positive contract premiums were used in this analysis because truck bids may, at times, exceed contract rail bids. For example, if a firm needs a given amount of grain immediately to meet prior commitments, truck-

*There were no relevant truck bids at Pacific Northwest export markets. The contract-free bid at these markets was estimated by subtracting an export elevator handling charge from Pacific Northwest FOB vessel bids.

delivered grain may receive a premium due to the flexibility that trucks provide in delivery times and locations. In addition, some markets cannot handle rail grain directly and grain shipped by rail into these markets must be trucked to the final destination point. The truck bid to these markets may represent the delivered rail bid plus truck freight to the final destination. In general, any market force which causes the truck bid to receive a premium over the rail bid in a market can result in a negative estimate of the DCP. In these cases, the DCP measurement for that day and market was set equal to zero for analytical purposes.

Bid prices reported by responding elevators in this study sometimes were FOB country elevator bids. These FOB bids were converted into equivalent delivered rail bids to be used in equation (1) by adding the published tariff rate for the maximum size rail shipment that the responding elevator could ship.

At times, other truck markets available to the elevator may offer a higher bid than the truck bid at market j in equation (1) after subtracting transportation costs. Higher truck bids at other markets would likely result from supply and demand imbalances at these markets. To ensure that contract benefits were not overstated by the exclusion of other viable markets, the procedure for calculating destination contract bid premiums was modified by comparing the net rail bid at market j with net truck bids from two alternative markets and selecting the smallest destination contract premium from the three markets. The two alternative destination contract premium measures are:

$$DCP_{ji} = (DRB_{nj} - PRR_{nj}) - (DTB_{ni} - TR_{ni}) \qquad (2)$$

and

$$DCP_{jk} = (DRB_{nj} - PRR_{nj}) - (DTB_{k} - PRR_{nk}) \quad (3)$$

where:

DCP_{ji} = destination contract bid premium at market j for elevator n based on truck bids at market i;

DCP_{jk} = destination contract bid premium at market j for elevator n based on the alternative truck bid at market k;

DRB_{nj} = delivered rail bid to elevator n at market j;

PRR_{nj} = published tariff rail rate from elevator n to market j;

DTB_{ni} = delivered truck bid at market i reported by elevator n;

TR_{ni} = truck rate from elevator n to market i;

DTB_{k} = delivered truck bid at market k;

PRR_{nk} = published rail rate from elevator n to market k.

Equation (2) measures the difference between the delivered rail bid net of the published rail rate from the sample elevator to the market with contracts and the best delivered truck bid reported by the sampled elevator net of the reported truck freight rate from the sampled elevator to the best truck market. Delivered bid prices and truck rates to market i were obtained from the responding elevators and represent the best truck bid the elevator had received on that day.

For corn, the estimated destination contract bid premium passed back to elevators was the smallest of the destination contract premiums estimated by equations (1), (2), and (3). For wheat and soybeans, the smallest destination contract bid premium was estimated by using the smaller contract premiums from equations (1) and (2). Equation (3) was not used for the soybean estimates because almost all elevators reported truck bids for

soybeans at nearby soybean processors, and these processors were generally the best alternative market for each soybean elevator. Equation (3) was not used for wheat because only two major markets--Texas Gulf and Kansas City--were reported for southern wheat and the major markets reported for northern wheat were Savage, Minneapolis, and Duluth, Minnesota. These northern wheat markets were combined into one market in the estimation process because the truck bids were essentially identical at these markets. Again, there were no viable alternative markets.

The Kansas City or Minneapolis truck bid was arbitrarily selected as the DTB_k for equation (3) depending on which market was most likely to be the best alternative for the elevator. The truck bid from market k is intended to represent another viable market alternative which is assumed to be free of contract impacts. The estimate of the alternative net contract-free bid to the elevator from market k is the truck bid at market k less the published rail rate from elevator n to market k. The published rail rate was used in equation (3) in place of the truck freight rate because, in most cases, it was the cheapest form of transportation from the sample elevators to Kansas City or Minneapolis.

Delivered truck bids at several markets are reported as a range of low and high bids for the day. In each case, the highest delivered truck bid was selected in the estimation process, because it is the bid that tends to attract grain; additionally, the highest truck bid results in more conservative estimates of contract benefits. Basing the final DCP estimate on the lowest of values estimated by equations (1), (2), and (3) is believed to result in more accurate estimates of the impact of railroad contracts on

grain bids to elevators, since most elevators have more than one market outlet.

Estimating destination and origin contract impacts on grain bids to farmers

The following linear regression equation was used to estimate the impact of railroad contracts on grain bids by elevators to farmers:

$$FB = a + \sum_{i=1}^{n} b_i X_i + e_i \qquad (4)$$

where:

FB = elevator bids to farmers;

a = constant;

b_i = coefficients;

X_i = variables affecting grain bids by elevators,

e_i = residual error.

An equation of this form was used for a separate analysis of each type of grain. The X_i variables included in these equations were:

1. contract-free bid which is the best net bid available to the elevator less any destination contract premium and mileage or carpool allowances,
2. mileage and carpool allowances on elevator leased and owned rail cars elevator n would have received for shipping grain to the market with the highest net bid,
3. destination contract premium to the market with the highest net elevator bid,
4. existence of an origin contract at elevator n with this variable taking the value of zero if elevator n does not have an origin contract and a value of one if elevator n has an origin contract,

5. elevator utilization as measured by the ratio of elevator storage capacity divided by the quantity of grain shipped annually,
6. the number of competing elevators within 20 miles of elevator n that can generate larger rail shipment sizes than elevator n.
7. a dummy (zero-one) variable accounting for differences among years.

The elevator utilization variable was included as a proxy for an elevator cost curve relating cost per unit to volume handled. The value of the utilization variable declines at a decreasing rate as the volume of grain shipped increases. This utilization variable follows the pattern of a short-run average cost curve which declines at a decreasing rate as the quantity increases. These regression equations were estimated for corn, soybeans, and southern wheat.

Estimating the impact of railroad contracts on elevator and farmer income

The estimated destination contract bid premiums available to elevators and the regression coefficients for destination and origin contracts were used to estimate the additional income to elevators and farmers during 1985 from railroad contracts for one four-county wheat study area in Kansas and one four-county corn-soybean study area in Iowa out of the total of 48 counties included in the study. Additional 1985 income to elevators from destination contracts was estimated by equation (5):

$$DCY_g^E = (\overline{DCP}_g) \left(\sum_{i=1}^{n} Q_{gi} \right) \qquad (5)$$

where:

DCY_g^E = estimated additional income to elevators in the study area from destination contracts on grain g in 1985,

$\overline{DCP}_g$ = average destination contract bid premium over all rail markets for grain g during the 1983-1985 study period,

$\sum_{i=1}^{n} Q_{gi}$ = total quantity of grain g shipped by rail by all elevators located in the study area in 1985.

Additional 1985 income to farmers from destination railroad contracts was estimated by equation (6):

$$DCY_g^F = (bDC_g)\ (DCY_g^E) \tag{6}$$

where:

DCY_g^F = estimated additional income to farmers in the study area from destination contracts on grain g,

bDC_g = regression coefficient for destination contracts (regression variable x_3) for grain g.

Additional 1985 income to farmers in the study areas from origin contracts was estimated by equation (7):

$$OCY_{gi}^F = (bOC_{gi})\ (\sum_{i=1}^{m} Q_{gi}) \tag{7}$$

where:

OCY_{gi}^F = estimated additional income to farmers in the study area from origin contracts on grain g in 1985,

bOC_{gi} = regression coefficients on origin contracts (regression variable x_4) for grain g,

$\sum_{i=1}^{m} Q_{gi}$ = total quantity of grain g shipped by elevators in the study area known to have had an origin contract in 1985.

Chapter V

RESULTS

The results of this study are presented separately for corn, soybeans, and wheat because the markets are different for each type of grain.

CORN ANALYSIS

Impact of destination contracts on corn bids to elevators

Twenty-one elevators provided corn bid information which was usable for at least a portion of the study period. Table 2 shows the estimated average destination contract rate premiums passed back to elevators in the form of higher price bids for corn on the sampled days in 1983, 1984, and 1985.

Table 2. Estimated average bid price premiums over truck bids in cents per bushel to elevators for rail-delivered corn at markets with and without destination contracts, by year.

Year	Average rail bid premiums at markets with destination contracts		Average rail bid premiums at markets without destination contracts	
	Number of observations	Cents per bushel	Number of observations	Cents per bushel
1983	233	3.3	18	1.9
1984	253	3.7	12	2.2
1985	235	3.7	3	0
Three-year total	721	3.6	33	1.9

The average destination contract premiums in table 2 as well as in tables 3, 5, 6, 8, 9 and 11 were calculated by dividing the sum of the destination contract premiums by the number of observations. This procedure weights the estimated destination contract premium at individual markets by the number of elevators reporting the highest net bid from each market on each day. Since more than one elevator could be receiving the same bid, t-tests were not performed because the requirement of independence could not be satisfied.

The overall average destination contract premium at markets with railroad contracts was 3.6 cents per bushel. When destination contract bids are compared only with truck bids at the same market, the average difference was 6.6 cents per bushel. However, since benefits estimated to be captured by elevators from contracts are the smallest of the three alternative measures used in this analysis, the estimated contract benefits on corn over the three-year period were reduced to 3.6 cents per bushel. This estimated average destination contract premium of 3.6 cents per bushel passed back to elevators is nearly double the 1.9 cent per bushel average difference between the non-contract delivered rail bids and truck bids. The per bushel destination contract rate savings passed back to elevators in the form of higher bids for corn ranged from 3.3 cents per bushel in 1983, to 3.7 cents in 1984 and 1985. The declining number for rail markets without contracts probably reflects the increasing use of destination contracts in the transport of corn.

Table 3 shows the estimated destination contract premiums at individual markets. These premiums ranged from 8.6 cents per bushel at Dubuque to 0.8 cents at Savage, Minnesota. Destination contract bids at three other

Table 3. Estimated average contract bid price premiums over truck bids by market in cents per bushel to elevators for rail-delivered corn at markets with destination contracts, 1983-1985.

Destination market	Number of observations	Average rail bid premiums at markets with destination contracts in cents per per bushel
Pacific Northwest export	250	4.7
Clinton, IA	132	3.3
Kansas City and beyond	122	2.9
Savage, MN	96	0.8
West Coast domestic	36	4.2
Texas Gulf	25	3.6
Dubuque, IA	14	8.6
Greeley, CO	13	3.1
Cedar Rapids, IA	13	2.0
St. Louis, MO	8	6.7
Eddyville, IA	6	0.9

markets were not included in table 3 because only two bids were reported at each of these three markets.

Generally, the more distant markets, including the Pacific Northwest export and West Coast domestic markets, had above-average destination contract premiums. Although exceptions were the relatively nearby Dubuque and St. Louis markets (which had the highest destination contract premiums), there were relatively few bids at these markets. Generally, the markets with below-average destination contract premiums were nearby markets of Savage, Minnesota, and Cedar Rapids and Eddyville, Iowa. A major reason why contract rate premiums at nearby markets are less than at more distant markets is that there is less opportunity for large per bushel rail rate

reductions on short distance movements than on long distance rail movements. In addition, Cedar Rapids and Eddyville are located in the middle of heavy corn-producing areas. Buyers in these markets can purchase much of their supplies by truck from nearby elevators.

When comparing only destination contract rail bids with truck bids at the same market, the Pacific Northwest export market had the largest contract premium of 12.2 cents per bushel. However, applying the alternative truck market rule reduced the estimated Pacific Northwest rate savings captured by elevators to 4.7 cents per bushel. Thus, the alternative market rule resulted in more conservative and probably more realistic estimates of contract rate premiums actually received by elevators.

Impact of railroad contracts on corn bids to farmers

The impact of railroad contracts on corn prices bid to farmers by elevators was estimated by a regression equation of elevator bids to farmers on the x_i variables. The results of the estimated equations are presented in table 4 and a discussion of these results follows:

1. Net contract-free bid to elevators

   The net contract-free bid to elevators, measured as the best bid net of truck or published rail rates less any destination contract premium and mileage or carpool allowances is the most important variable explaining or influencing corn bids to farmers. Since this variable is net of any freight costs, it incorporates the impact of multiple-car and unit-train rates on prices bid to farmers for rail-delivered corn. The regression

Table 4. Estimated coefficients and R^2s of the regression equation on corn prices bid to farmers by elevators, 1983-1985.***

Independent variables	Coefficient	Unit of measure	Standard error
Intercept	12.22**		3.15
Contract-free bid net of transport costs	0.94**	percent	0.01
Mileage and carpool allowances	0.21*	percent	0.10
Destination contracts	0.72**	percent	0.06
Origin contracts	1.06	cents per bushel	1.03
Elevator utilization	-0.44	cents per bushel	0.29
Number of larger competitors	0.69*	cents per bushel	0.34
Year 1984	-0.41	cents per bushel	0.58
Year 1985	-2.26**	cents per bushel	0.55
R^2	0.98		
Total number of observations	807		
Adjusted degrees of freedom	17		
F value	12,617**		

*Significantly different from zero at the 0.10 probability level.

**Significantly different from zero at the 0.05 probability level.

***The linear regression and standard error estimation procedures used in this study were specifically designed for the analysis of survey data and the results differ slightly from those obtained through standard ordinary least squares regression. See [6] pp. 60-70 and 70-81 for a discussion of the statistical procedures used in tables 4, 7 and 10.

coefficient for this variable indicates that elevators passed on to farmers approximately 94 percent of the net contract-free bid. The remaining six percent of the net contract-free bid is part of the handling margin retained by the bidding elevators.

2. Mileage and carpool allowances on elevator-owned or -leased rail cars

On the average, elevators that received rail car mileage and/or carpool allowances on elevator-owned or -leased cars passed on 21 percent of the mileage and/or carpool allowances to farmers in their bid price for corn. The remaining 79 percent of the mileage and carpool allowances was presumably used to pay the lease and ownership costs of the rail cars. Thus, assuming all other variables constant, elevators that owned or leased rail cars offered slightly higher bids to farmers for corn in an effort to buy the corn to keep their cars earning allowances. A small number of elevators in the sample were owned by grain-buying firms. In some cases, mileage and carpool allowances on rail cars owned or leased by grain buying firms may have been paid to the grain buying firm and passed on to the elevators they own through the grain bid price.

3. Destination contract benefits to farmers

The regression coefficient for destination contracts was significant and suggested that, on the average, elevators passed 72 percent of the destination contract bid premiums which they received on to farmers in the form of higher bids for corn. Thus, for corn shipped to markets with destination contracts, one estimate of the increase in bids to farmers for corn resulting from destination contracts would be about 2.6 cents per bushel higher (3.6 cents times 0.72).

4. Origin contract benefits to farmers

Nine of the responding elevators reported they had an origin contract. The estimated coefficients for origin contracts--contracts between the

country or subterminal elevators and railroads--was not statistically significant.

Most origin contracts in the corn-soybean belt are between railroads and elevators/subterminals. In this study, subterminals are defined as elevators performing both elevator and terminal functions; that is, these elevators buy from farmers and from other elevators and generally ship unit train size shipments. (Elevators that do not buy grain from farmers were excluded from this analysis because these elevators cannot pass contract benefits to farmers.) The rate savings passed to farmers by elevators/subterminals with origin contracts on corn are, on average, smaller than the destination contract premiums passed to farmers; the major reasons are that volume commitments on origin contracts are relatively small, and some elevators/subterminals with origin contracts use them primarily as a bargaining tool to obtain higher prices from buyers trying to satisfy their destination contracts' volume requirements. Thus, the primary benefits of origin contracts on corn bids to farmers may have been captured through the destination contract bid premium.

5. Elevator utilization

Elevator utilization, measured by storage capacity divided by annual shipments, was not statistically significant. The results indicate that changes in the storage/shipment ratio, which is intended to reflect any scale efficiencies among elevators, appear to have little if any impact on the prices bid to farmers.

6. Number of larger competitors

This variable is measured by the number of competitors within 20 miles of the responding elevator that can ship larger multi-car or unit-train shipments than the sample elevator. The coefficient was statistically significant, indicating that for each competitor which could ship larger rail units, the sampled elevators offered 0.69 cents per bushel higher corn bids to farmers. While this assumed linear relationship between farm price and the number of larger competitors would not likely hold in cases where an elevator faces many larger competitors, the number of competitors faced by elevators in this study appears small enough so that the linear relationship is realistic. Tests of a nonlinear relationship between farm price and the number of large competitors showed no improvement in the results.

Other measures of competition including the number of smaller and same size competitors and the total number of competitors were used in earlier versions of the model. However, the larger variable was believed to provide the best measure of competition and, as a result, was used in the final model. The results suggest that the number of competitors which can ship larger size rail shipments is a better explanatory variable of competition than the total number of competitors. A logical reason for these results is that competitors which can ship larger size rail shipments have rail rate savings or lower handling margins permitting them to increase bids to farmers.

7. Years

The coefficient for 1984 was negative and insignificant, while the coefficient for 1985 was negative and significant. Holding everything else constant, higher elevator margins result in lower bids to farmers. These results indicate that elevator margins on corn, on the average, increased 2.3 cents per bushel in 1985 over 1983 and 1984 margins. The large 1984 and 1985 crops increased the 1985 corn carryover and reduced the amount of available storage space. That, combined with the sharp drop in 1985 grain exports, allowed elevators to increase their margins in 1985.

The R^2 and F values are measures of the goodness of fit of the regression equations. The R^2 indicates the percent of the variance in corn prices bid to farmers that is explained by the regression equation. Thus, the regression equation explained 98 percent of the variance in corn bids to farmers. The total number of observations on bid prices in the regression equation was 807 and the adjusted degrees of freedom was 17. The F statistic is significant at the 0.01 probability level, indicating that at least one of the explanatory variables is significant in explaining corn prices.

SOYBEAN ANALYSIS

Impact of destination contracts on soybean bids to elevators

Eighteen elevators provided bid information which was usable for at least a portion of the study period. Table 5 shows the estimated average

Table 5. Estimated average bid price premiums over truck bids in cents per bushel to elevators for rail-delivered soybeans at markets with and without railroad contracts, by year.

Year	Average rail bid premiums at markets with railroad contracts		Average rail bid premiums at markets without railroad contracts	
	Number of observations	Cents per bushel	Number of observations	Cents per bushel
1983	118	3.0	33	1.6
1984	112	2.5	29	0.3
1985	107	3.0	11	1.6
Three-year total	337	2.9	73	1.1

destination contract rate savings passed back to country elevators in the form of higher price bids for soybeans on sampled days in 1983, 1984, and 1985. The per bushel destination contract premium for soybeans averaged almost 2.9 cents per bushel on the selected days over the three-year study period. There was little variation in the average destination contract benefits among years; the low was 2.5 cents in 1984 and the high was 3.0 in 1983 and 1985. The average rail bid premium in markets without contracts was 1.1 cents per bushel over the three-year period, with a low of 0.3 cents in 1984 and 1.6 cents in 1983 and 1985.

Table 6 shows the average difference between the delivered rail and truck bids at destination markets with access to railroad contracts. There were wide variations in the amount of destination contract rate savings passed back to the elevators. The largest rate savings was nearly 10 cents per bushel at St. Louis, followed by 6.7 cents per bushel at the Pacific

Table 6. Estimated average bid price premiums over truck bids by market in cents per bushel to elevators for rail-delivered soybeans at markets with railroad contracts, 1983-1985.

Destination markets	Number of observations	Average rail bid premiums at markets with railroad contracts in cents per bushel
Mankato, MN	97	0.5
Des Moines, IA	61	2.0
Pacific Northwest Export	37	6.7
Clinton, IA	30	1.9
Lincoln, NE	25	0.7
Texas Gulf	22	2.7
Kansas City, MO	19	3.9
Savage, MN	17	3.3
Cedar Rapids, IA	17	3.4
St. Louis, MO	13	9.7
Chicago, IL	6	0.3
Dubuque, IA	6	6.6

Northwest export market, and 6.6 cents at Dubuque. The smallest was 0.3 cents per bushel at Chicago.

A high percentage of the observations were processor markets located close to the sampled elevators in Iowa and Nebraska. Except for the Dubuque market, which had a small number of observations, the destination contract premiums at these nearby markets were relatively small. The short distances

and relatively low rail rates to these markets generally limits contracts to relatively small rate reductions in cents per bushel. This is one of the major reasons why the three-year average contract rate premium was almost one cent per bushel smaller for soybeans than for corn.

Impact of railroad contracts on soybean bids to farmers

The impact of railroad contracts on soybean bids by elevators to farmers was estimated by a regression equation with the same explanatory variables as were used for corn. The results of the estimated soybean equation are presented in table 7.

1. Net contract-free bid to elevators

The major explanatory variable of the soybean bids by country elevators to farmers was the net contract-free bid to elevators. The coefficient for this variable was 0.99 and was significantly different from zero. Elevators passed on nearly all of the net contract-free bid to farmers in the bid price for soybeans. Only one percent of the net contract-free bid was retained by elevators as a handling margin. This variable includes the impact of multiple-car and unit-train shipments on bids to farmers in cases where the soybeans were to be shipped by rail. The increased competition from the relatively large number of local processors is probably one reason why such a large share of the net contract-free bid was passed on to farmers.

2. Mileage and carpool allowances on elevator-owned or -leased cars

The estimated coefficient for mileage and carpool allowances was statistically insignificant, which indicates that this variable had

Table 7. Estimated coefficients and R^2s of the regression equation on soybean prices bid to farmers by elevators for the period 1983-1985.

Independent variables	Coefficients	Unit of measure	Standard error
Intercept	-5.98**		-2:06
Contract-free bid net of transport costs	0.99**	percent	0.003
Mileage and carpool allowances	0.11	percent	0.23
Destination contracts	0.32**	percent	0.07
Origin contracts	-1.42	cents per bushel	1.59
Elevator utilization	-0.03*	cents per bushel	0.01
Number of larger competitors	0.07	cents per bushel	0.12
Year 1984	-0.66	cents per bushel	0.65
Year 1985	-2.34**	cents per bushel	1.28
R^2	0.997		
Total number of observations	612		
Adjusted degrees of freedom	14		
"F" value	38,384**		

*Significantly different from zero at the 0.10 probability level.
**Significantly different from zero at the 0.05 probability level.

little or no impact on soybean bids to farmers. The short distances from the sampled elevators to local soybean processor markets and the heavy reliance of processors on soybeans delivered by truck from nearby elevators are probably the major reasons why the mileage and carpool allowance variable showed no impact on soybean bid prices to farmers.

3. Destination contract benefits to farmers

This variable was highly significant and its coefficient indicated 32 percent of the 1983, 1984, and 1985 destination contract soybean premiums were passed back to farmers in the form of higher bids. Thus, for soybeans shipped to markets with destination contracts, one measure of the increase in bids to farmers resulting from destination contracts would be about 0.9 cents per bushel higher (0.32 x 2.9). The remaining 68 percent of the destination contract premium would then be retained by elevators as a handling margin.

4. Origin contract benefits to farmers

Eight of the responding elevators reported they had an origin contract. The origin-contract variable coefficient was negative and insignificant, which means origin contracts had no statistical impact on elevator bids to farmers for soybeans. As with mileage and contract allowances, the short distances to local soybean markets and the heavy reliance of processors on soybeans delivered by truck from nearby elevators are probably the major reasons why the data show no origin contract premiums to farmers on soybeans.

5. Elevator utilization

Elevator utilization, measured by storage capacity divided by annual shipments, was statistically significant. The results indicate that when the storage/shipment ratio declined by one unit, the soybean bid to farmers increased by 0.03 cents per bushel over the three-year period. The higher bid prices resulting from increased elevator utilization

probably result from economies of size in grain handling or from the need to offer higher bids to farmers to attract grain from longer distances.

6. Number of larger competitors

This variable is measured by the number of elevators within 20 miles of the responding elevator that can ship larger multi-car or unit-train shipments than the responding elevator. The coefficient was statistically insignificant, indicating that the number of competitors which ship larger rail shipments had no impact on soybean bids to farmers. A likely reason for the insignificance of the competition variable on soybean bids to farmers is that a large portion of the soybeans purchased by local processors is delivered by trucks from nearby elevators. Moreover, the high carrying cost for accumulating large volumes of higher-valued soybeans discourages large unit-train soybean shipments. Thus, the rate advantage of unit trains does not create as much competitive advantage for soybeans as for corn.

7. Years

The 1984 variable was insignificant which indicates that 1984 handling margins remained approximately the same as in 1983. However, the 1985 variable was significant at the 10 percent probability level, indicating that the average elevator margins were 2.3 cents per bushel higher in 1985 than in 1983 and 1984. A major reason for the increase in elevator handling margins in 1985 was the large increase in soybean carry-over stocks accompanied by a tightening of available storage space. These large stocks and small storage availability forced farmers to sell their

grain and allowed elevators to increase their handling margins by lowering their bids to farmers.

The R^2s indicate that this equation explained 99.7 percent of the variations in soybean bids to farmers during the 1983-1985 period. The total number of usable observations in the regression was 612 and the adjusted degrees of freedom were 14. The significant "F" values indicate that at least one of the explanatory variables is significant in explaining the variation in soybean prices.

WHEAT ANALYSIS

The responding wheat elevators were grouped into northern wheat area elevators and southern wheat area elevators and a separate analysis is done for each. The southern wheat area includes Kansas and Oklahoma. The northern wheat area includes North Dakota, South Dakota, and Minnesota.

Impact of destination contracts on wheat bids to elevators in the southern wheat area

Twenty-five southern wheat elevators provided information which was usable during at least a portion of the study period. Table 8 shows the estimated average destination contract rate savings passed back to the southern area elevators in the form of higher price bids for wheat on the sampled days in 1983, 1984, and 1985. The destination contract premiums average 1.0 cents per bushel over the three-year period; however, the premiums increased from 0.8 cents per bushel in 1983 to 1.2 cents in 1985. The average premium on rail bids to markets with no contracts over truck

Table 8. Estimated average bid price premiums over truck bids in cents per bushel to elevators for rail delivered southern wheat at markets with and without destination railroad contracts, by year.

Year	Average rail bid premiums at markets with destination contracts		Average rail bid premiums at markets without destination contracts	
	Number of observations	Cents per bushel	Number of observations	Cents per bushel
1983	110	0.8	35	0.3
1984	176	1.0	40	0.4
1985	145	1.2	18	0.8
Three-year	431	1.0	93	0.4

bids ranged from 0.3 cents per bushel in 1983 to 0.4 cents in 1984 and 0.8 cents in 1985.

The average contract premiums for wheat were substantially smaller than for corn and soybeans. Industry sources indicate that there are fewer destination contracts at Gulf ports, where most of the southern wheat is sold, compared to West Coast ports, which receive a large share of the Nebraska/western Iowa corn sold to export markets. These same industry sources also indicate most of the destination contracts on southern wheat were from transit elevators to Texas Gulf Ports. The rate reductions in these contracts were based largely on the cost savings on large unit-train shipments under contract rates from the transit elevators to export ports. Thus, two possible reasons why the destination contract premiums are higher on corn and soybeans than wheat are: first, there were more markets with destination contracts on corn and soybeans than on wheat. Secondly, most

destination contracts on wheat retain the transit privilege, which may limit the rate reduction potential of these contracts.

Table 9 shows the estimated average contract bid premiums over truck bids by wheat market. The Texas Gulf destination contract premium over truck bids is one cent per bushel compared to 2.6 cents per bushel at Kansas City markets. However, the Gulf export market absorbs a considerably larger percentage of the crop than Kansas City.

Table 9. Estimated average rail delivered southern wheat contract bid premiums over truck delivered wheat by market in cents per bushel, 1983-1985.

Destination market	Number of observations	Average rail bid premiums with railroad contracts in cents per bushel
Texas Gulf	409	1.0
Kansas City	22	2.6

Impact of railroad contracts on wheat bids to farmers in the southern wheat area

The impact of railroad contracts on prices bid by elevators to farmers for wheat was estimated by an equation similar to that used for corn and soybeans. However, the mileage and carpool allowances variable was eliminated from the wheat regression equation because this variable was highly correlated with the origin contracts variable; that is, elevators with origin contracts tended to be the same elevators with leased or owned cars. Thus, the estimated origin contract benefits passed to farmers may include some mileage allowances which were passed to farmers. Industry

sources indicate that most of the mileage allowance benefits are retained by the elevators in the southern wheat area, which is consistent with the results obtained in the corn and soybean analysis. Only three of the seven southern wheat elevators with origin contracts reported any mileage allowances benefit during the study period. Given the small number of elevators receiving mileage allowances, the small amount of mileage allowance received by these elevators, and the small percentage of these mileage allowances passed on to farmers, the impact of mileage allowances on the origin contract benefit estimates would appear to also be small. The results of the wheat equation are presented in table 10.

1. Net contract-free bids to elevators

   This variable was highly significant in the wheat equation. The estimated coefficient indicates that southern wheat elevators passed on 89 percent of their net contract-free bids to farmers during the three-year period. The residual 11 percent was retained by the elevators as part of their handling margin.

2. Destination contract benefits to farmers

   The coefficient for destination contracts was not significant at the 0.05 probability level. However, the destination contract benefits on southern wheat were small relative to corn and soybeans, so there was little for elevators to pass back to farmers.

3. Origin contract benefits to farmers

   There were seven southern wheat elevators/subterminals in the sample with origin contracts. Elevators that do not buy wheat from farmers

Table 10. Estimated coefficients and R^2s of the regression equation on prices bid to farmers for wheat by southern wheat elevators, 1983-1985.

Independent variable	Coefficient	Unit of measure	Standard error
Intercept	19.25		17.48
Contract-free bid net of transport costs	0.89**	percent	0.05
Destination contracts	0.23	percent	0.20
Origin contracts	19.75**	cents per bushel	6.11
Elevator utilization	-0.52**	cents per bushel	0.17
Number of larger competitors	2.42*	cents per bushel	1.30
Year 1984	1.03	cents per bushel	1.12
Year 1985	-8.07	cents per bushel	6.56
R^2	0.90		
Total number of observations	848		
Adjusted degrees of freedom	22		
F	259**		

*Significantly different from zero at the 0.10 probability level.
**Significantly different from zero at the 0.05 probability level.

were excluded from this analysis. Most of the origin contracts in the southern wheat study area were between railroads and subterminals. Subterminals are defined as elevators that perform both elevator and terminal functions; that is, they buy grain from farmers and from other elevators, and generally ship in unit-train size shipments. The

coefficient for origin contracts on wheat was large and significantly different from zero. The estimated coefficient indicates that the seven country elevators/subterminals with origin contracts, on the average, increased their farm bids for wheat by 19.75 cents per bushel over elevators without origin contracts during the three-year period. This variable is second only in explanatory power to the contract-free bid net of transportation costs in determining the prices bid by country elevators for wheat to southern wheat area farmers.

One of the major reasons why origin contracts resulted in larger increases in wheat bids to farmers than for other grains is that published tariff rail rates on wheat have historically been high relative to published rail rates on corn and soybeans, allowing for substantial rate reductions on wheat contracts. Among the reasons for the difference is that the published wheat rates included transit privileges. The transit privilege allows wheat to be shipped to a transit location where it is unloaded for storage or milling, and later reloaded and shipped to the final destination with no additional freight charge. Until recently, transit rates have typically been for single-car service. The cost of transit service is included in the published rates.

The transit privilege still performs a major function in the wheat distribution system. Industry sources estimate that over half of all wheat transported by rail from the southern wheat producing areas moves under transit rates. The two main reasons for this relatively high percent of transit shipments are:

a. A large share of the grain storage capacity in the southern wheat producing region is located at inland terminal transit locations. The transit privilege permits the utilization of this large inland terminal storage capacity.

b. Aggregating large quantities of wheat at inland terminals permits the blending of wheat to meet export grade and quality specifications. Only a small number of modern local elevators are capable of blending and grading wheat to meet these specifications on a regular basis.

In contrast to tariff rates, industry sources indicate most origin contracts on wheat, as defined in this analysis, are point-to-point rates; that is, the wheat bypasses the transit system and moves directly from the origin elevator to the final destination.

While this analysis found large bid premiums to farmers at elevators/subterminals during the 1983-1985 years, industry sources indicate origin contract premiums have since declined. The apparent reduction in the origin contract bid premiums is likely the result of the introduction of large unit trains on the outbound transit shipments and the decline in published rail rates on wheat relative to contract rates in response to recent declines in wheat exports.

4. Elevator utilization

The elevator utilization ratio was statistically significant for the three-year period. With a one point reduction in the storage/shipment ratio, southern wheat elevators increased their bids to farmers for

wheat by 0.52 cents per bushel. This increase in bids is likely the result of lower handling costs as the quantity shipped increased and the need to offer higher bids to attract these larger quantities.

5. Number of larger competitors

This variable is measured by the number of elevators within 20 miles of the responding elevator that can ship larger multiple-car and unit-train shipments than the responding elevator. The coefficient was significant at the 10 percent probability level, indicating the number of larger competitors did affect the level of elevator bids to farmers. Each larger elevator within 20 miles of the responding elevator resulted in an increase in bids to farmers of about 2.42 cents per bushel during the three-year period. The impact of the number of larger competitors was sharply higher in the southern wheat area than in the corn-soybean area. The transition from single-car shipments in the southern wheat belt has been underway since about 1981. However, the decline in exports during this period has discouraged investments in elevator construction and upgrading. Thus, over half the wheat is still shipped from the southern wheat area under single-car transit rates. In the corn-soybean areas, the transition from single-car shipments to multiple-car and unit-train shipments has been under way longer and is nearly complete. Almost all elevators in the corn-soybean areas can ship larger size shipments; thus, the level of competition is more intense among elevators in these areas, and the bid price differential is smaller among the corn-soybean elevators than among wheat elevators.

6. Years

The year variable was insignificant for both 1984 and 1985. Thus, wheat handling margins taken by elevators in the southern region study areas did not change significantly during the three-year period.

The R^2 indicates that this equation explains 90 percent of the variance in farm prices over the three-year period. The total number of observations used in the regressions was 848 and the adjusted degrees of freedom was 22. The "F" values are significant at the 0.01 probability level in each equation which indicates that at least one of the explanatory variables was significant in explaining the variance of the price bid to wheat farmers.

Impact of destination contracts on wheat bids to elevators in the northern wheat area

Eight elevators responded with bid information which was usable for at least a portion of the study. Table 11 shows the estimated average destination contract rate savings passed back to northern area country elevators in the form of higher price bids for wheat on the sampled days in 1983, 1984, and 1985.

There were no destination contract bids for northern wheat in 1983. In 1984 and 1985, bids at markets with destination contracts averaged 1.5 cents and 0.1 cents per bushel above delivered truck bids, respectively. The average premium over the three-year period was 0.5 cents per bushel above the delivered truck rate. The average non-contract rail bid was 0.9 cents per bushel above the truck rate. However, most of the reported non-contract

Table 11. Estimated average wheat bid price premiums over truck bids in cents per bushel to elevators for rail delivered northern wheat at markets with and without destination contracts, by year.

Year	Average rail bid premiums at markets with destination contracts		Average rail bid premiums at markets without destination contracts	
	Number of observations	Cents per bushel	Number of observations	Cents per bushel
1983	0	0	28	0.9
1984	25	1.5	3	0.8
1985	56	0.1	0	0
Three-year total	81	0.5	31	0.9

bids for wheat were in 1983, when there were no destination contracts into the markets with the highest net bids to the sample elevators.

The cooperating railroad operating in the northern wheat study areas reported that during 1983-85, it had filed 80-90 destination contracts that included North Dakota, South Dakota, or Minnesota as origin states. Many of these contracts were for direct shipments to Pacific Northwest export ports, which allowed buyers to bid more aggressively for export shipments. However, the sampled elevators reported that their highest net bids were primarily to the Minneapolis/Duluth area markets.

Impact of railroad contracts on wheat prices bid to farmers in the northern wheat area

No responding northern wheat elevators reported origin contracts for 1983, 1984, or 1985, and this study found only a small number of bids with

small destination contract premiums. Thus, the data indicate that contracts had virtually no impact on wheat bids to elevators and farmers in the northern wheat study areas during 1983, 1984, and 1985, and there was no need to run regression equations to estimate the impact of destination and origin contracts on bids to farmers.

The cooperating railroad operating in the northern wheat study area reported 30-40 origin contracts in North Dakota, South Dakota and Minnesota during the 1983-85 time period. However, none of these origin contracts were in the selected study areas, and this study did not measure the impact of the origin contracts on wheat bids to farmers in other areas of these states.

The lack of positive impacts of railroad contracts on northern wheat bids could, in part, be the result of the relatively small number of responding elevators from the northern wheat area. Only eight elevators from the northern wheat study areas completed questionnaires. However, given that the cooperating railroad reported no origin contracts in the study areas, the relatively small elevator response rate did not alter the conclusion of no origin contract benefits in the study areas. Nor could the small response rate affect the conclusion of no destination contract benefits in the study in 1983 because there were no destination contracts at the dominant markets reported by the responding elevators.

ELEVATOR AND FARMER INCOME

Table 12 shows the data used to estimate additional 1985 income to elevators from destination contracts and to farmers from destination and origin contracts on corn, soybeans, and wheat presented in table 13. Income

Table 12. Data used to estimate additional income to elevators and farmers from rail contract rate savings for two four-county areas included in the study, 1985.

	Corn-soybean area*		Southern wheat area
	Corn	Soybeans	
Total bushels produced by farmers	82,505,000	21,297,000	39,073,000
Total number of farms	4,770	4,770	2,295
Percent of farm production marketed	58	90.3	76.9
Estimate of total bushels sold to elevators in the study area	47,852,900	19,231,191	30,047,137
Three-year average destination contract premiums for all rail shipments in cents per bushel**	3.4	2.4	0.8
Percent of marketed crop shipped by rail***	97	89	78
Total number of bushels shipped by elevators with origin contracts in the study area	26,072,188	9,732,200	27,212,375
Average percent of destination contract premiums which elevators pass on to farmers from tables 4, 7, and 10	72	32	0
Average amount passed to farmers by elevators with origin contracts in cents per bushel from tables 4, 7, and 10	0	0	19.75

*One reporting elevator in the corn-soybean area was a headquarters for an elevator included in the study. The headquarters was located several miles outside the four-county area for which the corn-soybean income estimate was made.

**Obtained by dividing the sum of all destination contract premiums by the total number of contract and non-contract rail bids.

***This estimate may be biased upward because no data were available from elevators not located on rail lines. However, elevators with no rail service tend to ship relatively small quantities of grain.

estimates were made for two four-county areas in the study--Calhoun, Carroll, Greene and Webster counties in Iowa for corn and soybeans, and Cheyenne, Rawlings, Sherman and Thomas counties in Kansas for southern wheat. No estimates were made for the northern wheat area because destination and origin contracts had little or no impact on bids to the elevators and farmers included in this study.

The 1985 data for the total bushels produced by farmers, total number of farms, and state average percent of farm production marketed for the four corn-soybean counties were taken from Iowa Agriculture Statistics [10]. The 1985 data for the total number of bushels produced by farmers and total number of farms in the four wheat counties were taken from data compiled by the United States Department of Agriculture [17]. The percent of farm production marketed was obtained by subtracting out the percent of the 1984 U.S. corn, soybean and wheat production that was placed in various government programs, used for seed or fed to livestock on producing farms [5, 18, 19].

The three-year average destination contract premiums listed in table 12 were used for all rail shipments and are lower than the estimates presented in tables 2, 5, and 8. The destination contract premiums in table 12 have been reduced proportionately to account for grain delivered under non-contract rail rates by dividing the sum of all destination contract premiums by the total number of bids. This adjustment process was necessary because the elevator data on rail grain shipments included both contract and non-contract shipments.

Data from the responding elevators in the two four-county study areas were used to estimate the percent of the marketed crop shipped by rail and

the total number of bushels shipped by elevators with origin contracts. The percent of destination contract premiums that elevators pass to the farmers and the per bushel origin contract rate savings passed to farmers by elevators were taken from tables 4, 7, and 10.

Table 13 shows the estimated average additional income paid to elevators in the study areas from destination contracts and the additional income paid to farmers in the study areas from destination and origin contracts. (It was not possible to measure the amount of origin contract

Table 13. Estimates of total destination contract premiums passed to elevators and destination and origin contract rate savings passed to farmers for two study areas, 1985.

	Corn-soybean area		Southern wheat area
	Corn	Soybeans	
Total destination contract premiums passed to elevators	$1,578,189	$410,778	$187,494
Total destination contract benefits passed to farmers*	$1,136,296	$131,449	0
Total origin contract benefits passed to farmers	0	0	$5,374,444
Total benefits passed to farmers	$1,136,296	$131,449	$5,374,444
Total number of farms	4,770	4,770	2,295
Total contract benefits passed to farmers per farm***	$238	$28	$2,342

*Obtained by multiplying the estimated total bushels shipped by rail by the three-year average destination contract premium for all rail shipments.

**Obtained by multiplying the total bushels shipped by elevators with contracts by the origin contract benefits passed to farmers.

***Some of the additional income from contracts may be distributed to farms or other elevators located outside the four-county area. In addition, farms and elevators in the four-county area may receive contract benefits from other elevators located outside the four-county area.

rate savings to the elevators because the contract rates are confidential.) The corn and soybean origin contract regression coefficients were not statistically significant; thus, the additional income from origin contracts was estimated to be zero for those crops in 1985. Likewise, the estimate of destination contract premiums passed to farmers in the southern wheat region in 1985 was estimated to be zero because the destination contract regression coefficient for this variable was statistically insignificant.

The destination contract premium was only applied to the estimated bushels of grain shipped by rail from elevators in the study areas. The estimated origin contract rate savings passed to farmers were applied only to grain shipped by elevators located in the study area which were known to have origin railroad contracts. No estimate was made of the impacts of increases in elevator and farmer bids upon competitors' prices. Thus, these are only the estimated direct impacts of contracts on additional income to farmers in these two four-county areas.

As shown in tables 12 and 13, origin contracts on southern wheat and destination contracts on corn had the greatest impact on the average additional income to farmers in 1985.

Chapter VI

STUDY LIMITATIONS

The best measurement of the impact of railroad contracts on bids to elevators and farmers would be to compare published and contract rail rates at individual markets and to compare net bids under published and contract rates across markets. However, the confidentiality of contract terms, including the contract rates, prohibits this type of analysis.

We believe the next best alternative is to compare delivered rail bids under contract with delivered truck bids. The crucial assumption underlying the analysis used in this study to estimate destination contract impacts is that delivered truck bids for grain at a given market are essentially free of railroad contract influences, and the difference between the rail bids and truck bids represents rail contract rate savings passed to the elevators. However, the analysis used to estimate origin contract impacts does not have this limitation because it does not require this assumption. Truck bids have no impact on the estimated origin contract bid premiums.

We recognize that rail-truck bid differentials are not affected by other variables besides rail contracts. A number of grain supply and demand factors can influence these differentials, including the following:

1. Prior to grain harvest, grain processors typically reduce their raw grain inventories in anticipation of lower prices during the harvest period. If the raw gain inventory declines to a level which may interrupt plant operations, the processing firm may increase its bid for truck delivered grain relative to rail

delivered grain because grain can be delivered faster by truck than by railroads. In these cases, the difference between bids on rail-delivered grain under contract and bids on truck-delivered grain will narrow. At other times, processors may prefer rail delivered grain over truck-delivered grain and the difference between the bids on rail-delivered grain under contract and truck delivered grain will widen.

2. Some buyers, particularly at terminal markets, may have inadequate rail-receiving facilities and may, for this reason, be willing to pay more for truck-delivered grain than rail-delivered grain. Other buyers may have excellent rail-receiving facilities and inadequate truck-receiving facilities. These buyers may be willing to pay more for rail-delivered grain than truck-delivered grain.
3. Exporters and domestic users often buy grain on a loaded date basis because of different delivery times of rail and truck delivered grain. Thus, truck bids could be at a temporary premium or discount depending on the need for grain on a given time.
4. Rail contracts themselves may influence truck bids to some markets due to competitive forces or contracts on outbound shipments of grain from that market.
5. On occasion, there may be other factors that affect rail-truck differentials.

While rail-truck bid price differentials may vary from time to time, if the basic assumption is correct that truck bids, averaged over time, are relatively free of railroad contract influences, the results of the analysis

of destination contract impacts will generally hold. Since the analysis of the impacts of origin contracts does not require the assumption that delivered truck bids are essentially free of contract impacts, the results of the impacts of origin contracts do not face this limitation.

The estimates of additional income to farmers from railroad contracts should be interpreted as approximations for the following reasons.

1. The data used to derive these estimates are based on national, state, and sample averages which may not precisely represent the marketing and pricing behavior in the two four-county areas.
2. Since the variances of some of the input data are unknown, it was not possible to estimate confidence intervals for the income estimates. Therefore, only point estimates are presented.
3. Additional income from railroad contracts in other areas may vary from the estimates for the two selected four-county areas.

This study only attempts to estimate the direct effects of rail contracts upon prices bid to elevators and farmers. Grain price bids received by elevators and prices bid to farmers were collected only from elevators and subterminals that buy directly from farmers.

No analysis was made of the amount of grain traded on the reported bids. It is possible that elevators negotiated and sold grain at higher prices than the bids initially offered by buying firms. It is also possible that farmers negotiated and sold grain to elevators at higher prices than the posted elevator bids. Grain trades made at prices exceeding the daily bids are more likely under contracts than without contracts because the contract rate reductions offer more opportunity for price negotiation.

Indirect price effects of contracts, including price increases by buyers and elevators without contract benefits to compete with competitors receiving contract rate savings, were not addressed in this study. The impacts of rail contracts upon the quantity of grain exported, on the prices paid by final consumers of grain products, and on the volume of business and net revenues of contracting railroads and competing modes of transport and competing elevators were not considered in this analysis.

APPENDIX A

Number of elevators in the population and in the sample by county within group within region.

Region	Group	County	State	Number of elevators	
				Population	Sample
Northern wheat	1	McHenry	North Dakota	1	1
		Mountrail	North Dakota	2	1
		Renville	North Dakota	2	0
		Ward	North Dakota	4	2
				9	4
	2	Cass	North Dakota	23	15
		Clay	Minnesota	11	9
		Norman	Minnesota	8	5
		Traill	North Dakota	12	9
				54	38
	3	Brown	South Dakota	10	5
		Edmunds	South Dakota	3	1
		Marshall	South Dakota	3	1
		McPherson	South Dakota	2	1
				18	8
Region total				81	50

Appendix A (Continued).

Region	Group	County	State	Number of elevators	
				Population	Sample
Southern wheat	1	Cheyenne	Kansas	5	2
		Rawling	Kansas	5	1
		Sherman	Kansas	4	3
		Thomas	Kansas	13	9
				27	15
	2	Ellsworth	Kansas	4	2
		Lincoln	Kansas	5	3
		Ottawa	Kansas	8	2
		Saline	Kansas	11	5
				28	12
	3	Douglas	Kansas	3	1
		Jefferson	Kansas	3	1
		Johnson	Kansas	3	0
		Leavenworth	Kansas	3	2
				12	4
	4	Alfalfa	Oklahoma	7	5
		Garfield	Oklahoma	14	11
		Grant	Oklahoma	6	6
		Kingfisher	Oklahoma	5	3
				32	25
Region total				99	56

Appendix A (Continued).

Region	Group	County	State	Number of elevators	
				Population	Sample
Corn-soybean	1	Faribault	Minnesota	9	4
		Jackson	Minnesota	4	1
		Martin	Minnesota	9	4
		Watonwan	Minnesota	6	3
				28	12
	2	Calhoun	Iowa	2	1
		Carroll	Iowa	8	5
		Greene	Iowa	2	1
		Webster	Iowa	7	5
				19	12
	3	Lincoln	South Dakota	5	0
		Plymouth	Iowa	8	2
		Union	South Dakota	5	2
		Woodbury	Iowa	8	5
				26	9
	4	Lancaster	Nebraska	16	7
		Otoe	Nebraska	15	4
		Saline	Nebraska	8	4
		Seward	Nebraska	6	2
				45	17
	5	Adams	Nebraska	6	6
		Buffalo	Nebraska	12	6
		Hall	Nebraska	8	6
		Kearney	Nebraska	9	7
				35	25
Region total				153	75

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