



# Dynamic Changes in Rail Shipping Mechanisms for Grain (Summary)

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This is a summary of “Dynamic Changes in Rail Shipping Mechanisms for Grain” by William W. Wilson, a Distinguished University Professor in North Dakota State University’s College of Agribusiness and Applied Economics. This paper received funding from USDA’s Agricultural Marketing Service (AMS) through cooperative agreement number 16-TMTSD-ND-0004. The opinions and conclusions expressed are the author’s and do not necessarily reflect the views of USDA or AMS. The full report is available online at <https://ageconsearch.umn.edu/record/303743>.

## WHAT IS THE ISSUE?

Variation in the supply and demand of transportation can be disruptive and costly to carriers and shippers alike, and market conditions change frequently. In supplying the cars shippers need to move their grain, railroads must contend with ever-changing volumes and locations of grain shipments. These vary with unexpected market shocks related to yield, weather, buyer demand, local and global supply/demand, among others. Similarly, grain shippers must deal with variation in grain volumes from farmers, as well as variability in rail prices and rail service. These ever-shifting, multiple factors considerably complicate the task of matching supply and demand for rail transportation of grain. The situation generates risk and imposes costs on both shippers and railroads.

Over the years, the primary and secondary railcar markets have evolved to allocate railcars and equilibrate the supply and demand for transportation more smoothly than in the past. Although fluctuations can never be eliminated, these mechanisms help ensure the availability and efficient movement of goods—facilitating transportation where and when it is needed most. However, despite creating some efficiencies, railcar auction markets are complicated, controversial, and not well understood by many market participants and analysts.

This study describes the emergence and key features of the primary and secondary railcar markets. It also examines their impacts on rail and shipper market conditions, such as daily car values, basis prices, and various sources of risk.

## WHAT DID THE STUDY FIND?

### *Railcar Markets: Evolution and Characteristics*

Prior to the 1980s, railcars were allocated on a first-come-first-served basis. There were no cancellation penalties, and some shippers allegedly placed “phantom orders” to increase their chances of obtaining rail capacity during periods of high demand. This method lacked transparency and resulted in inefficiencies, because railcars were allocated to those who ordered first, not those who valued the cars the most. In 1980, the Staggers Rail Act removed burdensome regulation and allowed the railroads to respond to market forces. In the late 1980s, the railroads began to implement alternative railcar allocation mechanisms to better account for supply and demand fluctuations in grain shipping and more efficiently allocate cars.

One early process revision was contracts, which enabled railroads and shippers to come to terms on future service levels. However, this method lacked transparency and still did not flex enough to the variable nature of railcar supply and demand. A formal auction-based method then emerged, known as “the primary market” for railcars, which allowed shippers to bid throughout the year on guaranteed rail service in the future.<sup>1</sup> Although cars can be allocated in many possible ways (e.g., first-come-first-served, historical averages, contracts), the auction system—which allocates cars to shippers who value the service the most—is the most efficient and has since been widely adopted.

The early auction contracts ensure accountability by imposing “bilateral penalties,” such as rail payments, if cars are late, or cancellation fees, if a shipper no longer wants the cars it ordered. Incurred by any party who defaults on the agreed-on terms, the penalties ensure timely service from carriers and disincentivize shippers from cancelling railcars. In later versions of the programs, railroads allowed shippers the option to transfer their railcars to other shippers, as an alternative to cancellation. This “transferability” led to the “secondary market” for railcars, where shippers can buy and sell excess cars with other shippers as needed, at the prevailing market price.<sup>2</sup>

### *Analytical Findings and Insights*

Factors such as the price for railcars and grain basis—the price difference between a local cash market and a nearby futures market—determine shipper profitability and act as signals to buy, sell, ship, or hold grain. The study finds that the secondary markets significantly influence these signals and shippers’ behavior. The study also finds these markets have added measurable value, evident in the premium shippers pay. Results indicate shippers implicitly accrue a value of \$185 per car on average for contracts that allow resale on the secondary market. This feature is valuable because the option to transfer reduces the risk associated with ordering too many cars.

Although previous studies have examined how transportation costs impact basis, the study further scrutinizes this relationship. It reveals that the export basis is strongly positively correlated with secondary railcar values which, in turn, are significantly affected by rail performance.<sup>3</sup> Notably, however, changes in transportation costs affect buyers and sellers of grain differently. A dollar increase in shipping costs increases destination basis by 82 cents and decreases origin basis by 19 cents, indicating grain buyers are more adversely affected than sellers by shipping cost increases.

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<sup>1</sup> The researcher explained, “[t]he primary market, is the initial allocation of trains in which shippers bid for rights to utilize a specified number of cars for a certain time period forward. With some variation across carriers, the general procedure is railroads offer trains for forward shipping, shippers bid, and the winners of each car offering are allocated contracts for service. The contracts specify elements, such as the forward order period, rate level (tariff), and number of cars per month.”

<sup>2</sup> As the researcher pointed out, it can sometimes be more profitable for a shipper to transfer cars than cancel. Canceling means losing the entire commitment. A shipper cannot cancel one or two train trips but does have the ability to transfer portions of the total order to another shipper.

<sup>3</sup> The study used velocity to measure rail performance. In this case, velocity refers to how many trips per month a shipper receives for each set of cars purchased. As such, velocity is a measure of supply of freight transportation.

The study's implications are notable. For example, the multiple factors influencing basis vary for buyers and sellers. To offset risk, the researcher suggests shippers should coordinate their rail purchasing decisions with their own buying and selling of grain. For example, to avoid demurrage fees or lost marketing opportunities, shippers could purchase slightly more grain than planned shipments as a hedge against variable rail performance.<sup>4</sup> For railroads, auction-based allocation allows efficiency gains; railroads could evaluate the design of auction mechanisms for further improvements.

## **HOW WAS THE STUDY CONDUCTED?**

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The researcher collected, assembled, and described a plethora of information on grain, rail, and railcar markets. This came from a variety of sources, such as firsthand knowledge, previous papers, and reviewing railroad websites and documentation. For the analytical insights, the study developed several regression models. For instance, an econometric model was developed to explore the relationship between secondary railcar prices and basis values. The model found these values were strongly correlated, interdependent, and determined simultaneously. In another model, the study replicated a regression analysis from an earlier study, looking at the relationship between "origin basis" and several explanatory variables (e.g., shipping costs, ocean rate spreads, outstanding export sales, railcars late, stocks to storage ratios, etc.). Furthermore, it used a materials requirement program model to analyze the value the transferability option provides to shippers. The study also used logistical models to determine a shipper's optimal decision-making under different market conditions. Sensitivities were conducted with respect to market carry, daily car value, and velocity volatility.

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<sup>4</sup> More specifically, the study indicated it was optimal for shippers to order 5 percent more grain volume from farmers than anticipated outbound shipments, given volatility in railcar supply and rail performance, as well as other uncertainties.