Influence of Shuttle Loaders on Grain Markets in Kansas and Montana

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In competitive grain commodity markets, agribusinesses have strong incentives to use a variety of strategies for reducing variable costs of handling grain. Shuttle train-loading elevators—high capacity, high-speed grain loading facilities—are a recent example of agribusinesses adopting technologies that improve efficiency and attempt to capture market share. These facilities provide improved rail rates, guaranteed railcar availability, and attract grain from further distances. For example, between 2010 and 2015, rail tariffs across numerous U.S. origins and destinations for wheat delivered by shuttle trains were, on average, 23.3% lower than delivery using non-shuttle trains (USDA Agricultural Marketing Service, 2016). Furthermore, the ability to load shuttle-unit trains within a designated amount of time enables elevators to preferentially reserve rail cars and, in many cases, more consistently meet the volume and timing needs of foreign buyers than elevators without shuttle-loading technologies.

While the economic advantages for agribusinesses and cooperatives to invest in shuttle-loading facilities can be directly observed, the downstream implications for farmers have not been clearly identified. That is, "Are cost savings passed by grain elevators passed along to farmers in the form of stronger basis bids?" and "Are there other benefits to farmers from these sizable investments?"

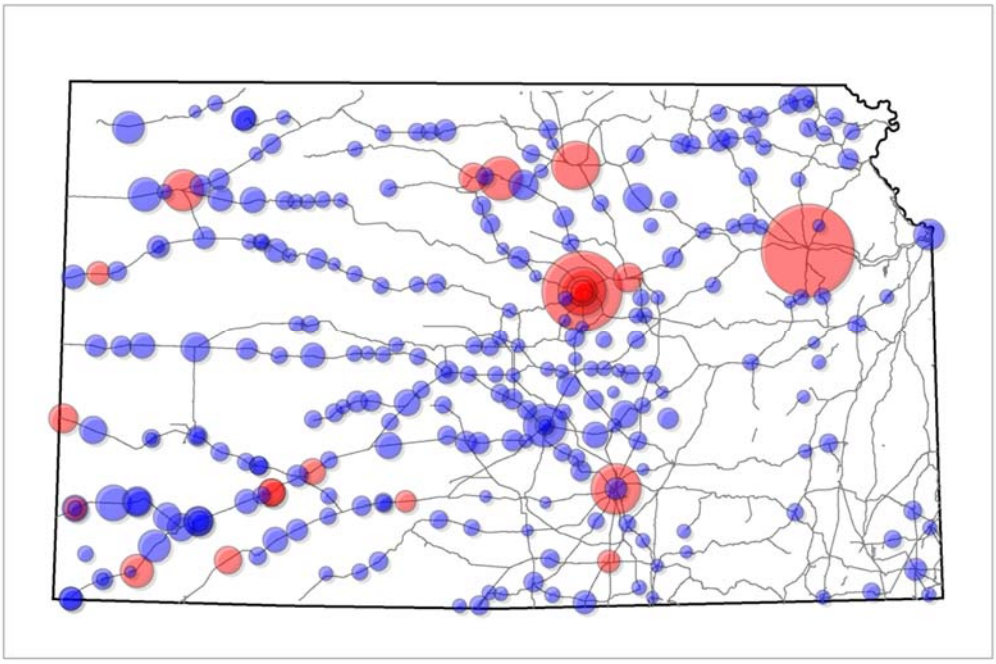
The purpose of this fact sheet is to provide information about the impact of shuttle-loading facilities on wheat basis, a measure that links the economic interaction between grain processing facilities and wheat producers. The insights presented below are based on nearby wheat basis and grain elevator information collected for the period 2005–2013 in two large wheat-producing states: Kansas and Montana. Both states have had substantial recent growth in the number of shuttle-loading elevators and have continued interest from agribusinesses to build additional high-capacity grain-handling facilities. To examine the differences between Kansas

and Montana, a panel dataset of daily cash and futures prices for 297 locations in Kansas and Montana over the 2005 to 2013 period. The key finding of the research is that shuttle-loading facilities have benefited farmers and those agribusinesses that decide to invest in the technology.

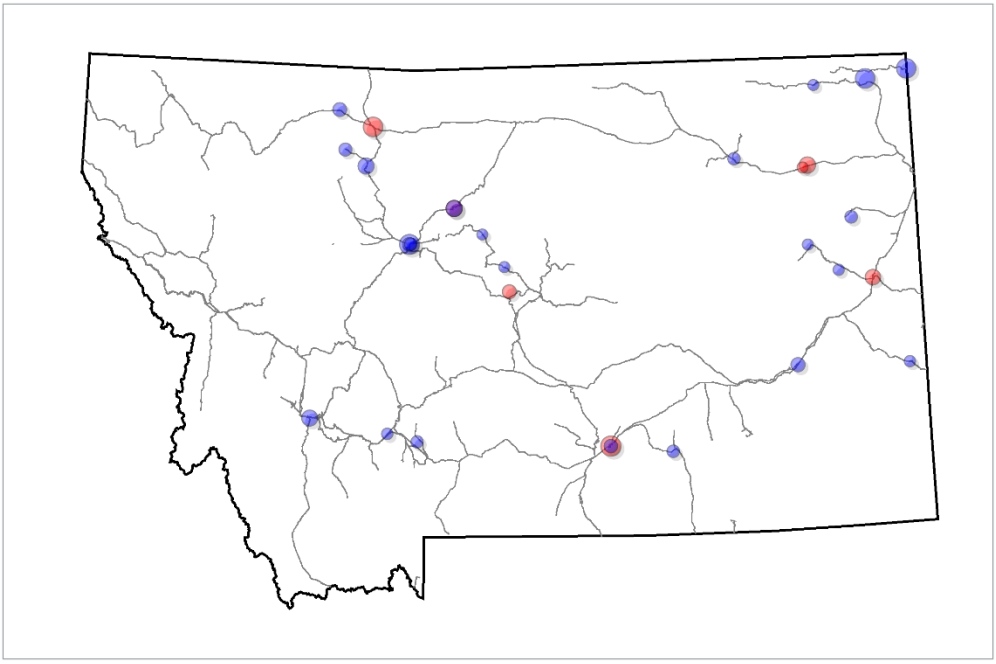
Comparing the Impact of Shuttle-Loaders in Kansas and Montana

Cash price bids at shuttle-loading elevators are higher than at conventional elevators. This is the primary finding from a statistical model of wheat basis, which accounts for other factors that could influence elevators' decisions to raise or lower cash bids, such as seasonal pricing, elevator location or state, past prices, and volatility of futures prices. Relative to conventional grain elevators in Kansas, newer, more technologically advanced shuttle-loading facilities offer, on average, a $0.08 per bushel premium to farmers. Shuttle-loading facilities in Montana also pass through cost savings in the form of higher prices, but the premium is, on average, only $0.04 per bushel.

The difference between the premiums in Kansas and Montana is likely a result of the significant historical difference of the wheat marketing landscapes in the two states. Perhaps the most salient difference that can help explain the pass-through disparity is the number of grain elevators to which farmers can cost-effectively deliver their wheat. That is, the degree of geographic competition between elevators for wheat delivery.



(a) Grain handling facilities and rail lines in Kansas



(b) Grain handling facilities and rail lines in Montana

Figure 1. Elevator Locations and Rail Lines in Kansas and Montana

Notes: Circles represent the location of a grain handling facility. Red circles represent facilities with shuttle train-loading capabilities and blue circles represent conventional elevators. The size of each circle represents the total storage capacity at the location relative to other elevators across the two states. Black lines characterize rail lines.

Figure 1 provides a visual representation of the different grain elevator density in Kansas and Montana, and helps illustrate the different geographic competition structures in the two states. The figure shows the location of grain elevators that procure wheat in each state. Shuttle-loader elevators are represented by red circles and conventional elevators are blue. The size of each circle corresponds to an elevator's licensed grain storage capacity, with larger circles representing greater capacity relative to other elevators. The lines on the map represent rail lines in each state.

In Montana, there is a greater distance between any particular farmer and the set of potential elevators to which the farmer can choose to deliver. This may increase opportunities for Montana elevators to exert some market power in determining prices to farmers within close proximity. Why? Many Montana farmers would face excessive costs to deliver to an alternative grain handling facility. An elevator in Montana has on average only 3 other competing facilities within a 60-mile radius.

Kansas, however, has a greater density of elevators with more storage capacity. An elevator in Kansas has 26 other elevators within a 60-mile radius. Furthermore, the average Kansas elevator storage capacity is two times as large as the average of elevators in Montana. As a result, Kansas elevators must compete more aggressively for grain deliveries by increasing a higher proportion of their shuttle technology cost savings that they pass through to farmers in the form of higher prices.

Implications of the Research

This research provides an important foundation for understanding how technological innovation within the wheat marketing channel impacts farmers and how these impacts are influenced by the marketing landscape. Because neither Kansas's nor Montana's wheat marketing landscape is likely to change drastically in the short or medium terms, factors such as elevator density, distance between farmers and delivery facilities, and production patterns will remain relatively stable. As such, these research findings can be used to more accurately assess investment and management decisions of shuttle-loading facilities.

One important example of how this work's findings can be used to assess management decisions is an improved understanding about the interrelationship between investment and geographic market power. Despite an increasing number of shuttle-loading facilities in both Kansas and Montana, those facilities are largely privately owned, while conventional elevators are mostly operated by a farmer-owned cooperative. In fact, only approximately 10% of shuttle-loading facilities are operated by cooperatives. Given the cost and throughput advantages of shuttle-loading technologies, many cooperatives could be considering replacing conventional elevators with newer shuttle-loading facilities. This research provides valuable insights toward making a more informed-decision about at least two aspects: whether to make the investment and the location of a new facility.

First, the findings of an $0.08 per bushel average pass-through in Kansas can be useful for helping evaluate the trade-offs of making an investment in upgrading grain handling technologies. For example, if the projected cost savings from investing in a shuttle-loading facility results in long-term cost savings of less than $0.08 per bushel, then the investment would

likely be suboptimal because the entirety of those cost savings would be passed through in the form of higher basis bids.

Second, the Kansas-to-Montana pass-through comparison can aid in selecting a more competitive site for a new or upgraded facility. Geographic competition between elevators and the proximity of farmers to a delivery location can significantly affect the proportion of cost-savings that a shuttle-loading facility may need to pass through. As such, these factors could be critical in improving the return on technological investment.

For elevators that are cooperatively owned, both the cost-savings pass-through and the ability to increase profitability through geographic differentiation are important to maintaining competitiveness in the grain marketing landscape. This research provides a framework for assessing differences in marketing behaviors in existing agricultural markets and increases understanding of future pricing strategies as competitive marketing structures continue to evolve.