ameliorated by a significant reserve of potential arable land and yield growth potential. While some land—in the United States and the world at large—has been lost to government set-aside and to urbanization, the loss of this land is minor in comparison to total area. The loss of land does have consequences for the distribution of land qualities. If better quality land may be lost to long-run retirement and urban development, more environmentally sensitive and poorer quality land may have to be brought into production. ◆

EMERGING ISSUES

Transportation Changes Increase Risks for Country Elevators

C. Phillip Baumel, Charles F. Curtiss Distinguished Professor of Agriculture, Iowa State University (515-294-6263)

Introduction

Farmers face increasing price and output risk. The increased price risk stems from the reduction in and eventual elimination of flexible government payments, increased volatility in grain purchases by importing countries and virtual worldwide elimination of grain reserves. Increased output risk comes from changing weather patterns and elimination of government constraints on acres planted in certain crops.

Country elevators face these same forces which increase their price and transportation risks. Country elevators are able to reduce their exposure to price risks by hedging their grain purchases on the Chicago Board of Trade. Hedging eliminates the risk from the volatility of world grain markets, but subjects the hedger to the less volatile "basis" risks. However, country elevators have no similar mechanism to protect themselves from the transportation risks arising from volatile changes in export sales and in grain production levels.

Rail-Car Shortages

Railroad grain-car shortages have plagued the grain industry for over 100 years. Since the early 1970s, the basic cause of grain-car shortages has been dramatic increases in grain export demand over short delivery periods. The most recent grain-car shortage problems were in late 1995 and early 1996. U.S. farmers harvested a huge 10.1 billion bushel corn crop in the fall of 1994. Grain exports were up 33 percent in 1995 over 1994; rail shipments to export ports were up 73 percent and barge shipments were up 25 percent. Despite these major increases in both rail and barge shipments to export ports, grain shippers wanted to ship even larger quantities during the last half of 1995 and the first half of 1996.

A huge increase in the demand for grain transport results in dramatic increases in barge rates. For example, in the fall of 1995, barge rates from McGregor, Iowa, increased almost 33 cents per bushel–more than double their rates prior to the increase in exports. While railroad rates also increased, the total cost of shipping by barge to New Orleans exceeded the cost of shipping by rail. These huge increases in barge rates and as well as barge shortages sent grain shippers rushing to the telephone to order large numbers of rail cars, and grain-car shortages followed. The Upper Mississippi River was frozen during the winter and railroads were expected to carry both the railroad and barge shares of grain exports.

Railroad efforts to increase rail car efficiency have created changes in the manner in which railroads operate. Railroads have initiated shuttle trains, car pools, reduced loading and unloading times, and 100-car train rates. These larger trains are committed and distributed to shippers who made prior commitments to the railroad. The result is that fewer rail cars are available to shippers who have not made prior commitments.

Almost all the new cars purchased since 1988 have been heavier and larger than the standard 263,000 pound gross weight cars. Approximately 25 percent of the entire grain-car fleet has 286,000 pound gross weight limits. These heavier cars cannot be used on most branch lines unless the lines are upgraded, or the cars are light-loaded to 263,000 gross weight. With the current emphasis on rail-car efficiency, these cars are not likely to be light-loaded and, therefore, are likely to be used only for mainline service. Assuming all future orders are for heavy cars, the share of cars available to branch line elevators will continue to decline.

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Grain-car supply is also affected by the trend toward market based methods of allocating railroad cars and providing guaranteed car supplies to shippers. This trend includes the BN, CP and the UP guaranteed car supply programs and other forms of guaranteed car supply. These market-based methods of allocating car supplies require grain shippers to do advanced planning and make advance commitments.

Another major force affecting the railroad grain-car supply is the manner in which elevators and farmers sell grain. For years, elevators have sold grain when the "basis" narrows or improves. Increasingly, farmers are hedging their grain and selling when the basis improves. Basis is defined as the nearby commodity futures price minus the local price the elevator (farmer) could receive for the grain. Normally, the local price is lower than the nearby futures price by the cost of transporting the grain to Chicago and the interest cost of holding the grain to the nearby contract expiring data.

Since a hedge consists of taking opposite positions in the cash and futures markets, the elevator (farmer) profits when the basis strengthens; i.e., the cash price increases relative to the futures price. When the basis increases to the level that sellers believe is very strong, many farmers and shippers sell large amounts of grain, which, in turn, tends to create excess demand for cars and grain car shortages. If the cash price rises above the futures price—i.e., the market is inverted—it is more profitable to sell almost all of the grain now rather than holding it for sale at a later date. However, elevators that sell large amounts of grain in strong or inverted basis markets without having a guaranteed supply of rail cars face a huge risk. They may fail to obtain the necessary cars and therefore fail to deliver by the contractual delivery date. This usually results in penalties for failure to fulfill the terms of the contract. Moreover, if the grain is stored outside, the elevator faces the risk that the grain will deteriorate as the late winter and spring temperatures rise. This situation occurred in the winter of 1996. Many elevators lost large amounts of money because the amount of grain sold exceeded the capacity of the grain transportation system to move it in the contracted time periods.

Increased Farmer Transportation Capacity

A recent survey of 3,500 farmers determined how and where farmers haul their grain from farms. Table 1 shows that semis (large capacity, 18 wheel trucks) haul more corn from farms than any other type of vehicle. Semis and tractor-wagons haul almost the same percent of soybeans from farms. The numbers in parentheses show the average miles each vehicle hauled corn and soybeans to market. Semis haul an average of about 37 miles per trip compared to 4.9 miles for tractor-wagons.

Table 1. Percent of corn and soybeans (and miles) hauled from farms by vehicle type, 1994/95 crop year

	Percent (miles)			
Type of Vehicle	Corn		Soybeans	
Tractor-wagons	32.0	(4.9)	34.5	(4.9)
Single axle truck	11.0	(8.1)	12.2	(10.2)
Tandem axle truck	19.8	(10.7)	19.1	(12.4)
Semis	37.2	(37.2)	34.2	(36.6)

Table 2 shows where farmers haul their corn and soybeans. Twenty-five years ago, almost 100 percent of the corn and soybeans were delivered to country elevators. Now, only 70 percent of the corn and 75 percent of their soybeans are delivered to country elevators. About 30 percent of the corn and 25 percent of the soybeans bypass country elevators on their way to other markets. On average, farmers haul their grain 7.5 miles to country elevators and 30-70 miles to other markets. The large increase in the number of farmer-owned semis makes these longer distance deliveries possible.

Table 2. Percent of corn and soybeans (and miles) delivered to destinations, 1994/95 crop year

	Percent (miles)			
Destination	Corn		Soybeans	
Country elevators	69.8	(7.5)	74.5	(7.5)
Processors	10.3	(49.7)	7.6	(31.7)
Mississippi River	10.6	(44.7)	8.6	(52.1)
Missouri River	4.6	(49.9)	4.1	(72.9)
Other	4.7	(9.4)	5.2	(39.5)
TOTAL	100.0	(17.7)	100.0	(15.9)

Table 3 shows that the number of farmer-owned semis is expected to double by the year 2000. The number of wagons and single-axle trucks are expected to decline sharply. Thus, country elevators face the risk that farmers who own semis will increasingly bypass local elevators and haul their grain to more distant markets.

Table 3. Expected change in the number farmer-owned grain hauling vehicles, 1995-2000.

Vehicle Type	1995-2000
	(Percent change)
Wagons	-18
Single axle trucks	-31
Tandem axle trucks	5
Semis	103

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Elevator Costs

An analysis of 10 Iowa elevators indicates the following:

- Absent major expansion programs, few, if any grain handling costs vary directly with bushels received. For the 10 elevators in the analysis, bushels received increased 67 percent between the 1993/94 and 1994/95 crop years. Yet, labor costs increased only 8.6 percent; this 8.6 percent is approximately equal to increased wage rates and fringe benefits.

- Therefore, the 67 percent increase in receipts was essentially handled by the same labor force. Total variable costs increased only 8.7 percent. About the only increase in variable inputs was a slight increase in electricity use

"Country elevators face the risk that farmers who own semis will increasingly bypass local elevators and haul their grain to more distant markets."

- Given the fixed nature of elevator costs, per bushel handling costs vary inversely with the number of bushels handled. With the 67 percent increase in bushels handled from 1993/94 to 1994/95, average total handling costs declined 33 percent from 15 cents in 1993/94 to 10 cents in 1994/95

- There are major differences in the cost per bushel among the 10 elevators. In 1993/94, the lowest-cost elevator had total grain handling costs of 12 cents per bushel while the highest-cost elevator had a total cost of 21 cents. In 1994/95, total costs per bushel ranged from 8 cents to 13 cents. In general, the elevators with the lowest cost had the largest storage capacity, the largest number of bushels handled, and were located on a rail line. The elevators with the highest costs were older elevators with relatively small storage capacity, low bushel receipts, and were not served by a rail line.

- Firms with multiple elevator locations can reduce per bushel handling costs by closing high-cost elevators and diverting the bushels from the closed elevators to their nearby lower-cost elevators. This diversion will lower the handling cost of the remaining elevators by increasing their bushels handled. An alternative to closing is to keep high-cost elevators open only during harvest or keep them open during harvest and then only one or two days per week during the remainder of the year. In this latter case, one crew of workers can be used to operate two or three elevators.

Conclusions

Volatility in grain production and exports increases the basis and quantity risks faced by country elevators. The inability of railroads to profitably supply cars to handle peak shipping periods increases the risk that elevators without a guaranteed car supply will default on sales contracts that call for delivery during peak periods. This suggests that grain elevators need to develop the ability to forecast peak shipping periods, obtain a guaranteed car supply for those peak periods, and consider grain sales strategies that do not rely exclusively on the "basis" to determine when to sell grain and to order grain cars. Finally, major incentives for grain firms, including farmer-owned cooperatives, to dramatically change the structure of the grain elevator industry include the increasing amount of grain hauled from farms in semis and the major impact of increased bushel receipts on elevator grain handling costs.

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