

Investigation of the Costs of an Increased Shipping Standard for Cotton Warehouses

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Abstract

The speed of shipping cotton from warehouses has become an important issue for the cotton industry. This paper examines issues relating to costs and benefits of an increased cotton shipping standard. The value chain model is used to identify improvements in incentives, information flow and warehouse filling and management strategies.

Background Issues

The U.S. cotton industry has been in a state of change for the past three decades. The industry has undergone a structural shift from a primarily domestic market to increasing dependent on exports (Jung and Lyford). Approximately two thirds of U.S. production channeled to overseas destinations, a substantial increase from the historical level of approximately 40%. China currently accounts for over 30% of U.S. exports. Textile manufacturing in the U.S. has declined dramatically. These shifts have increased the week-to-week volatility of cotton flow and placed more pressure on logistics and transportation. Historically, domestic mills sourced cotton lint at a relatively constant rate throughout the year. In contrast, international market opportunities are often driven by time sensitive changes in import tariff restrictions. The shift to export markets has therefore put particular pressure on cotton warehouses and cotton merchants. The industry has responded with both technological and policy based changes.

The cotton industry has rapidly adopted improvements in information technology such as high volume instrumentation (HVI) quality testing, electronic warehouse receipts and permanent bale identification. HVI was developed by the Textile Research Center (now named the International Textile Center) at Texas Tech University in mid 1960's. The technology which was subsequently commercialized and widely adopted by the

cotton industry facilitated the rapid measurement of quality measures such as strength, micronaire (fineness), color, length and length uniformity and trash content. HVI replaced the hand classification systems and facilitated the marketing of cotton on an identity preserved, quality differentiated basis (Welch et al.).

The HVI technology complimented TELCOT, another information technology system. TELCOT is a computer-based trading system which was developed by the Plains Cotton Cooperative Association (PCCA) in the mid 1970's. TELCOT greatly improved priced discovery mechanisms, reduced administrative costs and allowed buyers to screen cotton on the basis of specific quality characteristics, warehouse or gin location or crop year (Lindsey et al.) The large volume of cotton traded on the TELCOT system in turn led to the development of Electronic Title System (ETS), an online system which replaced paper warehouse receipts. The ETS improved efficiency, reduced costs and expedited the shipment of cotton to textile mill buyers (Cockerell). The TELCOT system eventually became the foundation for "The Seam" another online trading system which provided both grower to business and business to business trading among cotton growers, cooperatives, merchants and mill (Welch et al.) The cotton industry also adopted barcode-based permanent bail identification systems. These technologies allowed textile mills and other users to develop electronic fiber selection systems that selected specific cotton bales with uniform fiber properties and specific milling characteristics. Some of the systems became sophisticated enough to consider containerized shipping weight and volume limits as well as quality characteristics.

Policy changes have also impacted the cotton supply chain. The cotton industry supported regulations for cotton warehouse throughput. The standard was incorporated

into the United States Warehouse Act specifies a rate at which cotton warehouses must be able to ship cotton. This standard requires warehouses with USDA Commodity Credit Corporation (CCC) Commodity Storage Agreements (CSA) to have the capability of shipping 4.5% of their CSA approved storage capacity each week barring uncontrollable events. This regulation impacts the labor and rolling stock costs of cotton warehouses. Warehouse managers typically maintain a base level of employees and lift trucks that allow them to meet the shipping standard with overtime operations. Because peak level orders occur infrequently maintaining the capacity to meet the cotton flow standard requires many warehouses to maintain a larger labor force and rolling stock than would otherwise be economically justified.

While technologies increased the flow of information and quality signals across the stages of the cotton marketing system and shipping standards have attempted to impact international competitiveness, these changes have also decreased the operational efficiency of cotton warehousing operations. In order to fill orders, warehouse operators have to locate and assembling specific bales located at various locations within one or more warehouses. Most warehouse operators adopted computerized warehouse management systems which track bale locations and route lift trucks. However the process of locating and pulling bales randomly located over vast warehouse space is inherently inefficient. Many warehouses have shifted from block stacking systems, which maximize warehouse space utilization, to row stacking systems that optimize access to individual bales. While reducing useable warehouse capacity by over 50%, row stacking allows warehouse operators to retrieve any targeted bale without repositioning another bale.

While all aspects of the cotton industry have been proactive on the cotton flow issue, cotton warehouses operators and merchant shippers have had somewhat differing opinions toward shipping standard issues. Merchant shippers have advocated that the industry further increase shipping capacity. They maintain that a more rapid cotton flow would make US cotton more competitive and ultimately lead to increased sales and/or improved prices. This view was reflected in comments by Bobby Greene, chairman of the National Cotton Council's Performance and Standards Task Force, a group created by then National Cotton Council a Farm Press interview at the recent National Cotton Council Annual Meeting in Austin, Texas .

“The volatility of the number of bales needed to supply demand as we changed from a domestic to an export market represents a huge change...” “We often have a short time to ship. China buys U.S. cotton at various times during the marketing year, often on short notice. China will need U.S. cotton as soon as they exhaust other supplies...” “We have to be ready to ship all the cotton China will need (from the United States) in a short period. We are concerned that warehouses will need to ship more cotton in a shorter period of time than they are used to. We also wonder if we have the infrastructure to move it quickly enough.”

Warehouse operators, who bear the cost of increasing throughput capabilities, are less supportive of a higher shipping standard. Comments from an Oklahoma cotton warehouse manager characterize the warehouse operators' viewpoint;

We all recognize the need to keep U.S. cotton competitive. The cost of every employee and every forklift in my warehouse is ultimately borne by our farmer owners. During the last five years I have only been asked to ship at the maximum rate for one 12 week period. The real question is whether an increased shipping standard benefits the merchants or the farmers.

Warehouse managers point out that other factors such as information flow within the marketing channel, shipping logistics, and the scheduling and staging of cotton shipments also impact overall cotton flow. Many managers in the warehouse industry

question whether the benefits of a higher shipping standard outweigh the costs.

Warehouse operators question the rationale for further investment to enhance peak throughput capacity when such capacity is infrequently requested. This question is particularly pertinent for farmer-owned cooperative warehouses. Since warehouse costs are passed on to the farmer-owners, cooperative managers only support changes that ultimately benefit their membership.

The contrasting views on the advisability of a increased shipping standard also highlight another important issue. The distribution of the benefits (if any) of an increases shipping standard among the participants in cotton supply chain is not apparent. .

Conceivably, a more rapid cotton flow could potential make US cotton more attractive to international buyers or allow US merchants to capture time limited quota opportunities.

However the impact of these factors on the price received by US producers is extremely difficult to project. USDA statistics on prices received by producers (Table 1) do not fully reflect the price volatility facing individual producers. They also do not reflect potential prices from export sales that could have been obtained with a change in the shipping standard.

The price data does provide some insight into the arguments surrounding the shipping standard. During the 1997 to 2007 period the difference between the minimum and maximum monthly cotton price was as low as 5.56 cents and as high as 22.4 cents/lb. Variation from one month to the next ranged from 3 cents/lbs to over 12 cents/lb. Using the monthly variation as an admitably imperfect proxy for the possible price enhancement from moving cotton rapidly, would give a benefit range of \$15 to \$50/bale. Quantifying the benefits of an increased shipping standard would require both more precise estimates

of possible price enhancement and an estimation of what portion of the crop sales would receive the higher price.

Table 1: Average Cotton Prices Received by Producers (\$/lb.)

Year	Average	Minimum	Maximum	Yearly Variation	Monthly Variation
1997	0.772167	0.722	0.826	0.104	0.079
1998	0.740833	0.693	0.789	0.096	0.033
1999	0.677833	0.638	0.694	0.056	0.041
2000	0.649333	0.611	0.697	0.086	0.062
2001	0.517	0.428	0.581	0.153	0.068
2002	0.498083	0.431	0.58	0.149	0.049
2003	0.38925	0.278	0.521	0.243	0.078
2004	0.336333	0.267	0.443	0.176	0.07
2005	0.5165	0.454	0.678	0.224	0.121
2006	0.6225	0.616	0.633	0.017	0.011

Source: USDA

The distribution of the price impact between cotton merchants and cotton producers is also an important issue. Cotton merchants (often called merchant shippers) periodically purchase cotton from producers and elect to continue to store it (at their expense) at the existing warehouse location. Merchant shippers would therefore presumably capture a portion of any price enhancement since they hold a portion of US cotton stock. This could be an important issue since the producers would presumably paid the full cost of an increased standard through higher warehouse fees.

The costs of a change in the cotton shipping standard are also difficult to determine. Warehouse operation costs and throughput capabilities vary across warehouses and regions due to wage structures, equipment compliments, transportation logistics and other factors. The cost of increasing shipping capabilities also likely varies

across warehouses. Some warehouses may be able to exceed the current shipping standard with moderate changes while other warehouses might face substantial additional costs. The role of warehouse layout and filling strategies, spot weight procedures, and warehouse management systems on either costs or cotton flow is also not known. A joint research project at Oklahoma State University and Texas A&M University is investigating this important issue.

Value Chain Framework

The concept of a value chain is frequently used to provide insights into issues, such as the cotton flow issue, that overarch various stages of the marketing system. The term “supply chain” is generally used to describe the chain of activities from farm production, processing through retailing. Hobbs Cooney and Fulton describe a value chain as a vertical alliance or strategic network between a number of independent business organizations within a supply chain. In describing value chains the authors point to shared vision and common goals, mutual decision making, sharing of risk and benefits. They also suggest that value chain participants can use shared information to enhance the chain’s profits and competitiveness. Various authors have contrasted the collaborative aspects of a value chain with the adversarial business relationship typically found in the agri-food industries where each enterprise attempts to extract gains at the expense of the other market place players.

The U.S. cotton supply chain has adopted aspects of a value chain. Technologies such as the HVI system, TELCOT, permanent bail identification systems and ETS have allowed quality-based price signals to effectively flow across the various levels of the marketing chain. As previously mentioned, the Seam, on-line trading network has

facilitated transactions and information flow between businesses at various level of the cotton supply chain. However, the value chain framework is a useful tool to identify additional coordination that could be mutually beneficial to cotton producers, ginner, warehouse managers and merchants.

Increased coordination of information could be beneficial for the cotton flow issue. The electronic fiber selection programs used by textile mills and end users typically have the ability to consider information on warehouse location, but do not consider bale location within a warehouse or even specific warehouse building locations. It is conceivable that these systems could consider order filling logistics as a secondary optimization criteria, similar to how the systems evolved to optimize containerized shipping parameters.

As in most issues, improved incentives could align the goals of the marketplace participants. A frequent comment from cotton warehouse managers is the assertion that they would be willing to upgrade order filling infrastructure if merchants would provide incentives for faster shipping. Merchants counter with the argument that their current purchase patterns reflect preferences for shorter order filling times. Specific premiums for shipping speed would obviously help align incentives of the market channel participants. Research quantifying the impact of shipping speed on cotton price would also be useful.

A final research area which would address the cotton flow issue would involve the warehouse filling strategies and management strategies. Cotton warehouse managers currently fill warehouses on a first in basis or may segregate by gin source. Bales are generally not segregated by quality because cotton classing information is not available at

the point of bale delivery to the warehouse. A collaborative effort involving ginners, warehouse managers, merchants and textile end users might develop improved warehouse filling strategies which would improve order filling logistics.

Concluding Discussion

The cotton shipping standard problem is an intriguing issue facing the cotton industry. The issue highlights the need for research on a wide variety of topics. Quantifying the costs and benefits of an increased shipping standard would be an obvious first step. Other potential areas for investigation include systems to improve information flow on bale logistics, improved warehouse filling strategies and warehouse management systems.

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