Pass-Through of Cotton Prices: A Case Study Based Approach

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Introduction

Given the volatility in cotton prices in recent years, there has been understandable interest in the effects of cotton fiber prices on costs downstream in textile supply chains (i.e., yarn, fabric, assembled garments, and retail). In response to questions regarding both the timing and magnitude of changes in downstream prices, a series of analyses have been conducted by Cotton Incorporated and the ICAC. Approaches for estimating the effects of cotton fiber prices have been both theoretical, involving the weight cotton garments as well as cost structure information, and statistical, through the application of time series methods (Devine and Plastina 2011, Devine 2011).

After the declines registered throughout the spring and summer of 2014, cotton prices have been stable. With this period of relative stability, there likely has been sufficient time for the decreases experienced throughout the 2014 calendar year to be registered throughout supply chains, and it may be appropriate to re-examine relationships among supply chain prices. In this article, an alternative approach to the discussion to the pass-through of fiber prices is presented. This descriptive approach considers various periods of movement in cotton prices as case studies and examines how price relationships may have changed over time.

A motivation for this approach stems from complications associated with statistical modelling of the pass-through of fiber prices. The spike in prices experienced during the 2010/11 crop was unprecedented in terms of its magnitude. While this event underlined the fact that fiber prices can significantly influence costs downstream, the size of increase during that single time period overwhelms the statistical relationships in other time periods of comparatively “normal” movement in fiber prices. For this reason, it may be helpful to consider changes in fiber prices on a case by case basis.

To begin such an analysis, it is first necessary to establish a definition of what signifies a move in cotton prices. The definition that was chosen was a change in the A Index of at least 20 cents/lb. within a six month period. While this designation is somewhat arbitrary, a move of 20 cents/lb. within a six month window was selected since it was considered as large enough in magnitude and short enough in timespan to produce observable responses downstream.

Since the onset of the 2004/05 crop year, there have been four such “swings” in prices (see Figure 1). The first was the decrease that accompanied the onset of the global recession in the fall of 2008. The second was the sharp increase in prices that defined the 2010/11 price spike. The remaining two swings can be seen as part of the process that returned values from the record high back to levels closer to historic averages. This process

occurred in two steps, one immediately following the peak in prices and another after the announced reform of Chinese cotton policies in the spring of 2014.

The time periods and changes in price experienced in each price swing are explicitly defined in the leftmost column of Table 1. In that column, the first month indicates the time when the swing began, and the second month denotes the time when the swing ended. Correspondingly, the second month also indicates when the peak/trough was reached for the A Index in that particular swing.

Data Sources

With price swings defined, it is possible to describe the changes in supply chain prices that followed. Price data are available at the yarn, garment, and retail stages (insufficient data are available at the fabric stage). As in previous analyses, the data selected are considered to represent the global supply chain that provides for the U.S. retail market. Since the U.S. apparel market can be considered price competitive, it may be possible to make inferences for other retail markets.

The A Index, widely accepted as the best representation of a world price for cotton, is used to describe fiber prices. The A Index is an average derived from offers made by the world's cotton merchants for shipments to the Far East. Since these prices are offers, they are not necessarily transactional. During time periods of extreme volatility, such as the 2010/11 spike, there may be a separation between the offers made by merchants and the actual prices paid by mills (i.e., mills may refuse to pay the prices being offered). For this reason, an alternate fiber price series based on import values is presented and discussed. This alternate price, called landed fiber price throughout this article, is derived as a volume-weighted average of global cotton fiber imports. Since this and describes values for cotton as it is being delivered, it can be considered representative of transaction prices.

Cotlook's yarn index, which is a trade weighted average of 20s and 30s offered for export, is used to represent global yarn prices. Similar to the A Index, these values are representative of offered values and therefore may not describe actual transactions. For that reason, an average of global yarn prices was also created. This price series is referred to as the landed yarn price and represent a volume weighted average of global import prices for cotton yarn (HS 5205).[1]

Sourcing costs for assembled garments are described by the average landed cost for cotton-dominant apparel imported into the U.S. and represent seasonally adjusted prices per square meter equivalent (SME). Retail apparel prices are approximated by using the U.S. CPI for garments and are also seasonally adjusted.

[1] Data for the landed fiber and landed yarn series were derived from the Global Trade Atlas. This data source includes figures from virtually all governments that report imports according to the international standard (i.e., the Harmonized System). The prices in each of the landed series (fiber and yarn) were derived as the average import cost for all countries reporting within a lag of three months relative to the current month.

Summary Table

For each of the downstream stages, the peak/trough that followed the peak/trough in the A Index can be identified and the corresponding change in supply chain prices over that time period can be quantified. A summary of these findings is shown in Table 1. Each cell of the table includes data describing the magnitude and timing of changes of supply chain prices following different swings in the A Index.

To illustrate how the entries in Table 1 can be interpreted, consider the changes in fiber prices that accompanied the August 2008 to November 2008 decrease in the A Index. During this price swing, the A Index decreased 23 cents/lb. or 30% (from 78 cents/lb. in August 2008 to 55 cents/lb. in November 2008). The decrease in average import prices that followed was of a similar magnitude (20 cents/lb., from 75 cents/lb. in August 2008 to 56 cents/lb. in April 2009), but there was a lag of five months between the time when the A Index (November 2008) reached its low point and when in landed prices (April 2009) stabilized at lower levels. Values in the other rows and columns can be interpreted in the same way, with the percentage change referring to the increase/decrease in costs that followed the change in the A Index and the lag indicating the temporal difference between peaks/troughs.

Discussion

When we take a look at the data in Table 1, there are several findings that can be derived across price swings. One of them is that the effects of cotton fiber prices diminish and take longer to develop as we look further downstream. Offered yarn prices reacted with the least amount of lag relative to the A Index and were either simultaneous to the A Index or lagged 3-4 months. This indicates that spinners attempt to pass on changes in offered fiber prices (A Index) in the prices they are offering for future delivery (yarn index).

Movement in landed fiber prices ranged from 3 to 7 months, which was similar to the lag in landed yarn prices. Changes in garment prices were longer, with the lag in peak/troughs between 3 and 14 months. Retail prices were not consistently affected by changes in fiber prices. This is not surprising given that retail prices involve costs for many non-fiber factors, including advertising, floor space, wages for salespeople, as well as all of the costs associated with design, logistics, and planning.

An outlier relative to timing cost changes is the coincident movement in the A Index and retail apparel prices in 2014. With the many non-fiber costs associated with retail, it likely is difficult to attribute the changes in the CPI between the spring and fall of 2014 to the changes in the A Index over at the same time period. In addition to costs associated with bringing goods to market, retail prices are also a function of consumer demand. Weaker than expected sales volumes, such as those that occurred in early 2014, can also affect prices offered to consumers. Correspondingly, there can be reductions in retail prices that result from demand-related issues. The declines in the apparel CPI in 2014 may have been driven more by retailers' need to move merchandise rather than a decrease in sourcing costs associated with cotton prices.

If we consider the changes in retail prices in 2014 as being a result of demand-related factors, it leaves only one time period, when cotton prices more than doubled in 2010/11, that a possible causal relationship between fiber prices and retail prices could be drawn. The inconsistency in the relationship between swings in

the A Index and any lagged changes in retail prices explain why it is difficult to identify a statistical relationship between cotton prices and retail apparel prices outside of the price spike.

For garment prices, where cotton prices represent a larger proportion of costs, the direction of change during each of the price swings was consistent with movement in the A Index. Simple ratios (Table 2) of the percentage change in garment sourcing costs relative to the percentage change in the A Index were contained within a relatively tight range between one-fifth and one-sixth the magnitude of the percentage change in the A Index. These back-of-the envelope elasticities suggest a 20% change in the A Index could be expected to result in 3-4% change in sourcing costs.

However, these simple ratios do not control for other cost factors such as possible changes in country of origin, labor costs, or exchange rates that could influence future relationships between the A Index and garment sourcing costs. The importance of non-fiber costs to landed garment prices may be evident in the much longer time period it took for a bottom in garment prices to be reached after the decrease in the A Index that accompanied the onset of the global financial crisis in the fall of 2008. The prolonged impact that the recession had on demand, in terms of increasing the level of competition among manufacturers for limited order volumes, may have eroded manufacturers' pricing power. This could have kept downward pressure on prices and kept sourcing costs at lower level for a longer time period.

At the yarn stage, it is possible to compare prices being offered (yarn index) against actual transaction costs (landed yarn prices). When examining the relationships between these two price series and the A Index, there are notable differences. One is in the magnitude of response. In the swings that occurred in 2008 and 2014, the percentage change in the prices being offered for yarn were similar to the percentage changes observed in landed yarn prices, with the percentage change in yarn index being five points larger than the percentage change in landed yarn prices in each instance. In the time periods surrounding the price spike, there was wider separation, with the percentage change in the yarn index being 23 and 18 points larger than the percentage change in landed yarn prices.

A potential reason for the discrepancy comes from the fiber market. A similar pattern of separation appeared between the A Index (offered prices) and landed fiber prices (transacted fiber prices). Outside of the price spike, there were only very small differences between the percentage change in the A Index and landed fiber prices (3 percentage points in the fall of 2008 and 1 percentage point in 2014). Meanwhile, the swings surrounding the 2010/11 spike produced much wider separation. Following the increase from August 2010 to March 2011, there was an 89 point separation in the magnitude of change in the A Index and the magnitude of change in landed fiber prices. On the way down, after the decreases between March 2011 and June 2012, there was a 20 point separation in the magnitude of change in the A Index and the magnitude of change in landed fiber prices.

The wide separation between the prices for cotton fiber that were being offered and the prices that were transacted upon likely stems from the extreme uncertainty and financial pressures during the 2010/11 time period. As prices climbed higher, more mills may have been reluctant to sign contracts. This can explain some of the separation. An additional explanation is that deliveries on contracts for the most expensive cotton were delayed. This cost averaging would have diminished the peak in landed prices. Evidence of this behavior arises in the timing of the declines that followed the spike in the A Index. At seven months, the lag in the trough of landed prices was several months longer than the lag in the peak/trough for any other swing in the A Index.

An effect of these developments was that the ratios of percentage change for the A Index relative to landed fiber prices and yarn prices (Table 2) surrounding the price spike were not consistent with those from other time periods. This suggests inconsistencies in the relationship between the A Index and landed prices, and therefore, inconsistencies in the elasticity. In 2008 and 2014, figures for landed fiber prices were near 100%, which indicates that a given percentage change in the A Index was matched by the change in average import prices. The values surrounding the spike were much lower, and likely were a result of the factors identified in Table 1 and discussed above, that buying diminished as prices were peaking and that shipments were delayed in the months after the peak.

The same pattern in price relationships is evident in ratios for the yarn stage in the supply chain, although the inconsistency in the relationship relative to price spike is focused in the figures describing movement in the swing when prices were increasing (August 2010 to March 2011). Values for the yarn index suggest that a 20% change in the A Index would result in a 12-16% change in the yarn index in periods outside of the spike. During the spike, the ratio dropped to near 40% indicating that the effect of fiber prices on yarn prices was diminished. This could have been a result of mills making fewer purchases, and not following the market all the way up. The same explanation could be used to describe the movement in the landed yarn prices, where the ratio value was lower in the data surrounding the run-up in the A Index in 2010/11 than it was during any other price swing.

Conclusions & Continued Work

The discussion in this article is based on a descriptive approach to the analysis of the effects of the pass through of cotton fiber costs downstream in cotton supply chains. Findings indicate that different swings in cotton prices resulted in the different responses downstream, and that there were anomalies in pricing relationships that occurred with the spike of 2010/11. In purely statistical analyses, these differences in price relationships would likely be averaged across each of these time periods. Correspondingly, differences across time periods could be missed and likely would be overwhelmed by the magnitude of the change occurred with the spike.

Since the movement in 2010/11 was unprecedented, similar events of extreme volatility could be expected to be extremely rare. For that reason, it may be important to develop and understanding of how changes in cotton prices may affect prices downstream following swings in the A Index of “normal” magnitudes. The figures presented in this article may be helpful in developing such understanding and could also inform continued time series analysis of supply chain prices.

Refer ences

Devine, Jon and Plastina, Alejandro. “Pass-Through Analysis of Cotton Prices” *Beltwide Cotton Conferences,* 2011.

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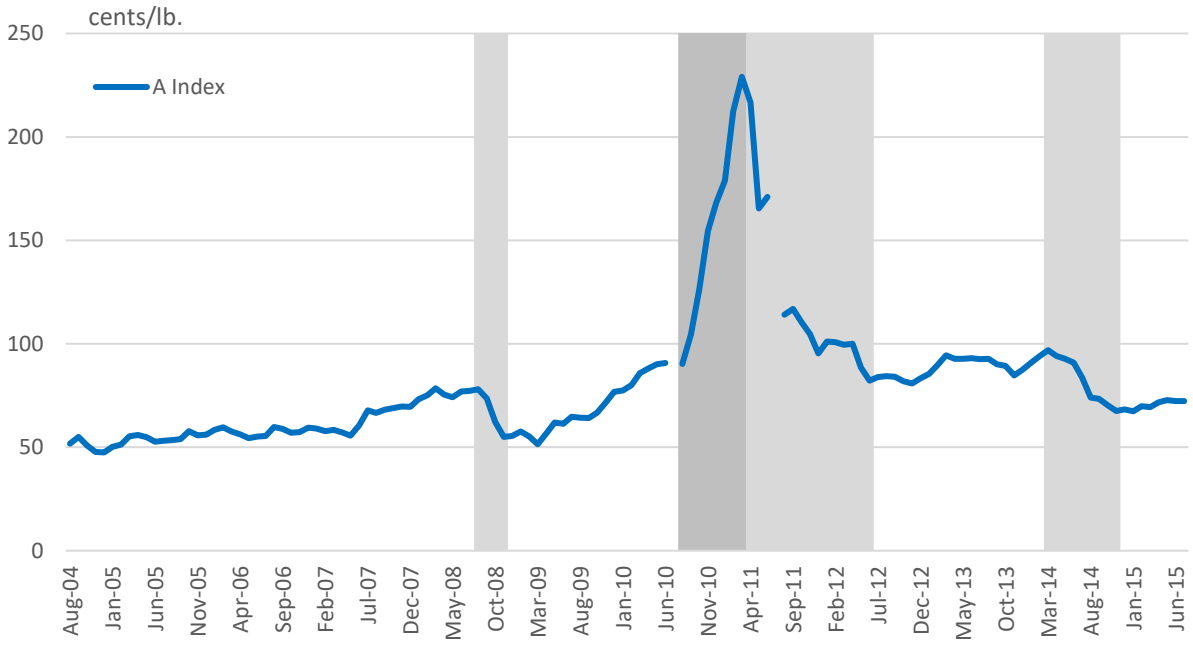
Figure 1. Price Swings in the A Index (2004/05 to Present)



Note: Swings defined as a 20 cent/lb. move within a six-month period. Price increases are denoted with darker shading. Price decreases are denoted with lighter shading.

Table 1. Summary of Movement in Supply Chain Prices Following Swings in the A Index

Swing in Fiber Prices	A Index	Landed Fiber	Yarn Index	Landed Yarn	Landed Garments	Retail Apparel
Aug08 to Nov08	-23 ¢/lb. -30% Nov 2008	-20 ¢/lb. -27% 5 mo. lag	-18% 4 mo. lag	-13% 6 mo. lag	-6% 14 mo. lag	No decrease
Aug10 to Mar11	+140 ¢/lb. +154% Mar 2011	+44 ¢/lb. +65% 3 mo. lag	+67% No lag	+54% 2 mo. lag	+24% 6 mo. lag	+6% 9 mo. lag
Mar11 to Jun12	-146 ¢/lb. -64% Jun 2012	-66 ¢/lb. -44% 7 mo. lag	-44% No lag	-36% 5 mo. lag	-10% 3 mo. lag	No decrease
Mar14 to Nov14	-22 ¢/lb. -23% Nov 2014	-23 ¢/lb. -24% 4 mo. lag	-19% 3 mo. lag	-14% 4 mo. lag	-4% 6 mo. lag	-4% simultaneous

Table 2. Ratios of the Percentage Change in Supply Chain Prices Relative to the Percentage Change in the A Index

Swing in Fiber Prices	A Index	Landed Fiber	Yarn Index	Landed Yarn	Garment Imports	Retail Apparel
Aug08 to Nov08	n/a	90.0%	60.0%	43.3%	20.0%	n/a
Aug10 to Mar11	n/a	42.2%	43.5%	35.1%	15.6%	3.9%
Mar11 to Jun12	n/a	68.8%	68.8%	56.3%	15.6%	n/a
Mar14 to Nov14	n/a	104.3%	82.6%	60.9%	17.4%	1.7%