COTTON PRICE FORECASTS UNDER ALTERNATIVE SCENARIOS

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Abstract

The International Cotton Advisory Committee (ICAC) Secretariat has been forecasting season-average cotton prices since 1988. In 2007, after two seasons of unsatisfactory forecasting results, the Secretariat adopted a new econometric model, based on fundamental factors of the world cotton economy. The model uses four explanatory variables, which are themselves combinations of estimates and projections of stocks and mill use, trade, and judgment on whether Chinese trade is dominated by government actions or by private activity. Using its expanded price model, the ICAC Secretariat forecasts cotton prices for the 2014/15 season under four alternative scenarios in this paper. These scenarios are a fast release of the Chinese reserve, a slow release of the Chinese reserve, and a slowdown in cotton demand.

Introduction

This article reviews the methodology used by the ICAC Secretariat to forecast cotton prices. The first section summarizes the price model implemented between 2007 and 2011. The second section explains the current price model and presents forecasts for 2013/14 and 2014/15. The third section presents forecasts under alternative scenarios, namely a fast release of the Chinese reserve, a slow release of the Chinese reserve, and a slowdown in cotton demand.

The 2007 Price Model

The ICAC Secretariat has been forecasting season-average cotton prices since 1988. In 2007, after two seasons of unsatisfactory forecasting results, the Secretariat adopted a new econometric model, based on fundamental factors of the world cotton economy, which is explained in detail at <http://www.icac.org/econ/Price-Model>. The model uses four explanatory variables, which are themselves combinations of estimates and projections of stocks and mill use, trade, and judgment on whether Chinese trade is dominated by government actions or by private activity:

$$\ln(A_t/A_{t-1})=a*\ln(X_t/X_{t-1})+b*\ln(X_{t-1}/X_{t-2})+m_t*c*\ln(Y_{t-1}/Y_{t-2})+(1-m_t)*d*\ln(Z_t/Z_{t-1}) \qquad (1)$$

where A_t is the average value of the Cotlook A Index in season t; X_t represents ending stocks as a percentage of mill use in season t for the world minus China; Y_{t-1} represents ending stocks as a percentage of mill use in season t-1 for China; Z_t equals 100 * (1- net imports into China/world imports); m_t is a dummy variable equal to 0 for 1991/92 through 2002/03, 2008/09 through 2009/10, and 2011/12 through 2013/14 and 1 for all other seasons; and a, b, c, and d are the parameters to be estimated. The dummy variable indicates whether changes in Chinese stocks are mainly motivated by policy decisions ($m_t = 0$) or changes in market conditions ($m_t = 1$).

The model assumes all explanatory variables are given (even though some are projections) and finds the price that would need to exist in order to support the levels of the explanatory variables. This single equation model does not retro-fit the impact of prices on the other variables, neither does it directly account for the impact of variables outside the model (such as the price for polyester or other competing fibers, economic growth, or inflation).

The goodness of fit of the model, *i.e.*, how well the model "explains" prices, is measured by the coefficient of determination (R^2). If the goodness of fit is 1.0, the model "explains" all changes in prices, while if the goodness of fit is 0.0, the model cannot "explain" changes in prices at all. The goodness of fit of the model declined from 0.885 in August 2007 to 0.803 in April 2011 (figure 1), when model results became highly unsatisfactory within an environment of record-high-volatility.

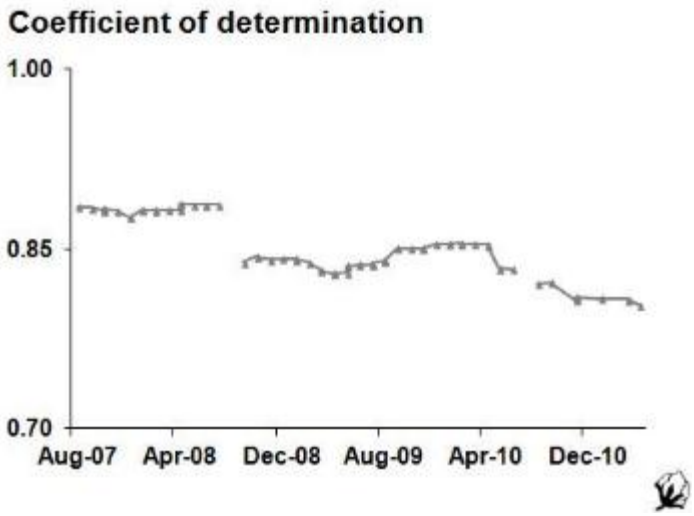

Figure 1. Goodness of fit of the model, by date of publication

The Expanded Model

The Secretariat conducted a series of statistical tests on how to improve the explanatory power of the model. No variable was found to add explanatory power to the model by correlating with cotton prices in 2007/08, 2009/10 and 2010/11 and not correlating with the other explanatory variables. By adding dummy variables for 2007/08 (D07), 2009/10 (D09) and 2010/11 (D10) to the ICAC Price Model, the explanatory power of the "expanded model" increases substantially. However, this tweak of the model does not improve its predicting power, and virtually the same forecast of the season-average Cotlook A Index is obtained with or without the dummy variables. Formally, the expanded model is:

$$\ln(A_t/A_{t-1})=a*\ln(X_t/X_{t-1})+b*\ln(X_{t-1}/X_{t-2})+m_t*c*\ln(Y_{t-1}/Y_{t-2})+(1-m_t)*d*\ln(Z_t/Z_{t-1})+e*D07+f*D09+g*D10 \qquad (2)$$

Similarly to the previous model, the expanded model can be used to produce same-season forecasts and one-season ahead forecasts.

In February 2012, the expanded model forecasted a 2011/12 season-average A Index ranging from US$1.15 to US$1.43 with a midpoint of US$1.28, while the actual 2011/12 season-average A Index amounted to US$1.00 per pound. The main drivers of the error were the differences between the projected and the realized 2011/12 levels of Chinese imports (3.3 million tons vs. 5.3 million tons), mill use in the world minus China (14.5 million tons vs. 13.5 million tons), and ending stocks in the world minus China (8.6 million tons vs. 9.1 million tons).

The forecast presented to the 521st Meeting of the ICAC Standing Committee on December 13, 2012 for 2012/13 was 84 cents per pound, with a 95% confidence interval ranging from 70 cents to 103 cents. The 2012/13 season concluded with the actual season-average A Index at $0.88 per pound. The main drivers of the error were the differences between the projected and the realized 2012/13 levels of Chinese imports (2.57 million tons vs. 4.4 million tons) and ending stocks in the world minus China (9.6 million tons vs. 8.2 million tons).

2013/14 Season Forecast

As of January 2, 2014, the expanded model forecasts the A Index to average 91 cents per pound in 2013/14, with a 95% confidence interval ranging from 81 cents to 103 cents. It assumes that the ending stocks-to-mill use ratio in the world minus China will fall slightly from 54% in 2012/13 to 53% in 2013/14, and that Chinese imports will fall by 30% from 4.4 million tons in 2012/13 to 3.1 million tons in 2013/14. Furthermore, the forecast of 91 cents is a weighted average of the raw forecast from the model and the average A Index observed since the beginning of the season. The confidence interval is also adjusted periodically to reflect the additional information about the realized values of the A Index since the previous forecast. Figure 2 illustrates the evolution of the A Index and the same-season forecasts since then.

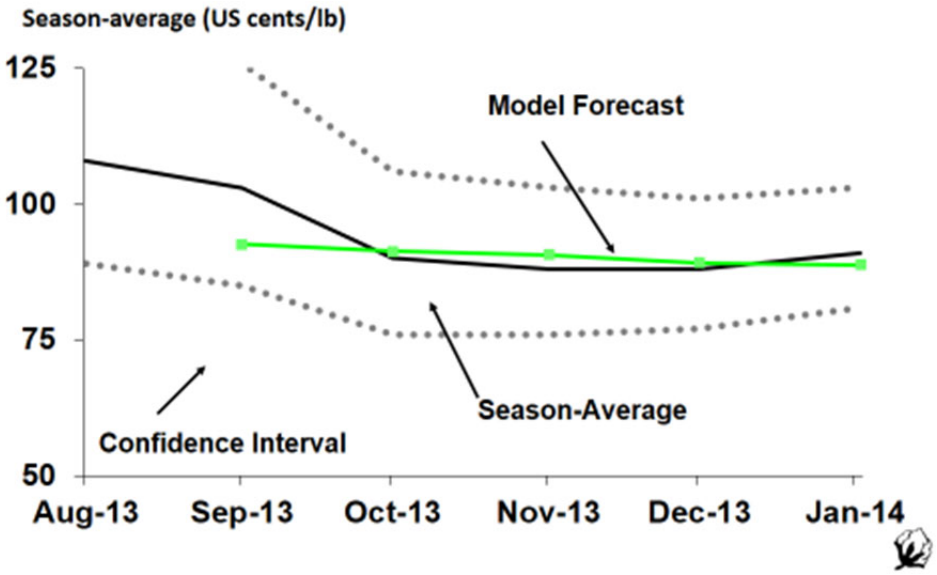

Figure 2. A Index in 2013/14: Forecast versus Actual, ordered by publication date

The fitted parameters of the expanded model to data from 1975/76 to 2013/14 (Appendix 1) are reported in Table 1. The coefficient of determination, *i.e.*, the goodness of fit of the model, is 0.860. The statistical fit is good as shown in Figure 3.

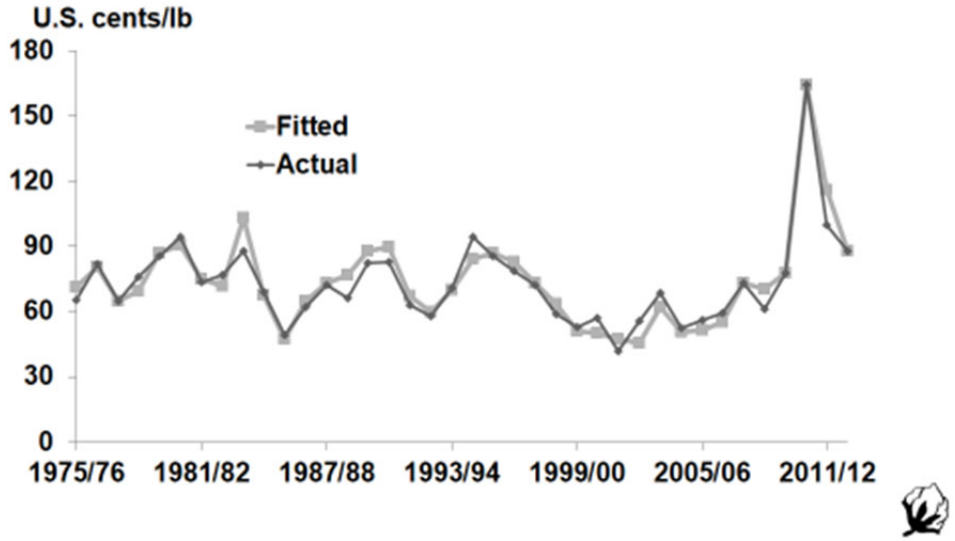

Figure 3. Fitted and actual values of the Cotlook A Index, 1975/76 – 2012/13

According to Table 1 below, the change in the stocks-to-mill use ratio for the world less China in season t, $\ln(X_t/X_{t-1})$, is the most important explanatory variable. With an elasticity coefficient of -1.2, a 5% increase in the stocks-to-mill use ratio in the world less China induces a 6% price decline in the same season. The second most important explanatory variable is the change in the stocks-to-mill use ratio for the world less China in season t-1, $\ln(X_{t-1}/X_{t-2})$: with an elasticity coefficient of -0.46, a 5% increase in the stocks-to-mill use ratio in the world less China in the preceding season induces a 2.3% price decline in the current season. Consequently, if the stocks-to-mill use ratio in the world less China increases by 5% in season t-1 and again by 5% in season t, the Cotlook A Index will fall, on average, by 8.3% in season t.

Table 1. Estimated coefficients of the extended model, 1975/76-2011/12

Explanatory Variable	$\ln(X_t/X_{t-1})$	$\ln(X_{t-1}/X_{t-2})$	$m_t*\ln(Y_{t-1}/Y_{t-2})$	$(1-m_t)*\ln(Z_t/Z_{t-1})$	D07	D09	D10
Fitted Parameter	-1.202	-0.462	-0.045	-0.332	0.203	-0.250	0.858
t-statistic	-10.87	-4.66	-1.02	-1.54	2.22	-2.39	8.39

The dummy variables D07, D09 and D10 are all significant at the 5% level and account for most of the changes in the A Index in 2007/08, 2009/10, and 2010/11. The variables that attempt to capture changes in the market fundamentals and government decisions in China, mt*ln(Yt-1/Yt-2) and (1-mt)*ln(Zt/Zt-1), are not significant at the 10% level, but are kept in the model because the fit of the model to the data is better with them than without them: the Akaike Information Criteria is greater (in absolute value) with the variables than without them (1.787 vs 1.779). A 5% increase in the Chinese stocks-to-mill use ratio would only induce a 0.2% decline in world prices in the following season. Finally, during seasons when changes in Chinese stocks were mainly driven by government decisions instead of market forces, increases in net imports into China resulted in increases in cotton prices during the same season; for example, if net imports into China increased from zero to 5% of world gross imports, the value of the explanatory variable Z would fall from 100 to 95 and the A Index would increase by 1.7%.

2014/15 Season Forecast (Base Scenario)

In the scenarios discussed below, we are forecasting the season-average Cotlook A Index for the 2014/15 season. However, the 2013/14 forecast serves as the basis to forecast the 2014/15 season average. The fitted parameters of the expanded model to data from 1975/76 to 2013/14, assuming the true A Index in 2013/14 is 89 cents per pound, are reported in Table 2. The coefficient of determination, *i.e.*, the goodness of fit of the model, is 0.860. The fitted value for the A Index in 2013/14 is 91 cents, or 2 cents higher than the reference value.

Fitted parameters in table 2 are very similar to those in table 1. However, the variable capturing the effect of net imports into China due to government decisions, $\ln(Z_t/Z_{t-1})$, becomes significant at the 5% level.

Table 2. Estimated coefficients of the extended model, 1975/76-2013/14

Explanatory Variable	$\ln(X_t/X_{t-1})$	$\ln(X_{t-1}/X_{t-2})$	$m_t*\ln(Y_{t-1}/Y_{t-2})$	$(1-m_t)*\ln(Z_t/Z_{t-1})$	D07	D09	D10
Fitted Parameter	-1.204	-0.514	-0.045	-0.218	0.205	-0.239	0.910
t-statistic	-9.87	-5.00	-0.95	-1.05	2.08	-2.14	8.16

Assuming that in 2014/15 (a) world cotton mill use will increase by 807,000 tons to 24.6 million tons despite a 241,000 tons decline in Chinese mill use, (b) ending stocks will increase by 553,000 tons in the world and by 86,000 tons in China, (c) international trade will decline by 686,000 tons where a 1.2 million tons reduction in Chinese imports is offset primarily by imports in the rest of Asia, then the forecast of the season-average A Index for 2014/15 ranges from 74 cents to 111 cents, with a midpoint at 90 cents per pound.

At that level, international cotton prices would be competitive with domestic cotton prices in China if the import duty is low. Adding 18% to 90 cents to account for taxes and fees applied to imported cotton into China, the resulting 106 cents are 28 cents below the average Chinese reserve selling price of 18,000 yuan per ton (or 134.1 cents per pound assuming an exchange rate of 6.089 yuan per US dollar). However, if a 40% tariff is applied, the resulting price would be 142 cents, which is 8 cents higher and not competitive with domestic cotton prices in China.

Forecasts Under Alternative Scenarios

Given the structure of the expanded model, the following forecasts are based on different assumptions about the explanatory variables. The ICAC Secretariat first chooses reasonable estimates (for past seasons) and forecasts (for the current and the following season) of ending stocks, mill use, imports and exports; then makes a judgment about the impact of government policy on Chinese stocks; and finally runs the price model to obtain the price forecast. The price forecast is not retro-fitted into the model to analyze its impact on the explanatory variables.

Given that most of the variability of price forecasts through time stem from the variability inherent in the estimates and forecasts of the explanatory variables (since coefficient estimates change very little through time) (Plastina 2012), it seems reasonable to analyze alternative scenarios by changing the levels of the explanatory variables and comparing the resulting price forecast with the Base Scenario described in the previous section. As China is expected to change its cotton policy in the next season, the focus of the analysis is 2014/15.

Scenario 1: Fast Release of Chinese Reserve and China Remains Net Importer

In this scenario, the Chinese government is assumed to liquidate reserves at prices lower than those at which the cotton was purchased, until reaching a target 5.5 million tons in stock. This would result in considerable losses for the Chinese government, but in substantial support for Chinese textile mills.

Ending stocks in the Chinese private sector are assumed at 1 million tons. Therefore, total ending stocks in China in 2014/15 are assumed at 6.5 million tons, or 5 million tons lower than in the base scenario. It is assumed that liquidated cotton from the reserve would displace 1.5 million tons of imported cotton and create an additional 3.5 million tons of mill use in China.

Mill use would amount to 11.3 million tons in China, and 17.3 million tons in the world less China (500,000 tons higher than in the base scenario because the 1 million tons of additional stocks outside China would put downward pressure on prices and stimulate additional cotton consumption). World mill use would reach 28.5 million tons. Imports by China would amount to 444,000 tons, and world imports would reach 6.3 million tons. World ending stocks would amount to 16.9 million tons, or 4 million tons lower than in the base scenario. Table 3 compares the assumed levels of mill use, ending stocks and trade in Scenario 1 with those from the Base Scenario.

Under Scenario 1, the forecast of the 2014/15 season-average A Index ranges from 68 cents to 102 cents, with a midpoint at 83 cents per pound.

Table 3. Fundamentals in 2014/15 under Scenario 1 and Base Scenario

Region	Variable	Base Scenario (in thousand tons)	Scenario 1 (in thousand tons)	Difference (in thousand tons)
China	Imports	1,944	444	-1,500
	Mill Use	7,800	11,269	3,469
	Exports	7	7	0
	Ending Stocks	11,469	6,500	-4,969
World Minus China	Imports	5,806	5,806	0
	Mill Use	16,774	17,274	500
	Exports	7,759	6,259	-1,500
	Ending Stocks	9,400	10,400	1,000
World Total	Imports	7,749	6,249	-1,500
	Mill Use	24,573	28,542	3,969
	Exports	7,766	6,266	-1,500
	Ending Stocks	20,869	16,900	-3,969

Scenario 2: Fast Release of Chinese Reserve and China Becomes a Net Exporter

This scenario is similar to Scenario 1 in that the Chinese government is assumed to liquidate reserves at lower prices until reaching a target 5.5 million tons in stock. The main difference stems from the assumption about how liquidated cotton affects Chinese mill use and trade. In Scenario 2, liquidated cotton is assumed to create an additional 1.5 million tons of mill use in China (instead of 3.5 million tons assumed in Scenario 1), generate 2 million tons of exports by China, and displace 1.5 million tons of imported cotton into China.

Ending stocks in the Chinese private sector are assumed at 1 million tons and total ending stocks in China are assumed at 6.5 million tons in 2014/15. Mill use would amount to 9.3 million tons in China, and 17.3 million tons in the world less China (500,000 tons higher than in the base scenario because the 3 million additional stocks outside China and the 2 million tons exported by China would put downward pressure on prices and stimulate additional

cotton consumption). World mill use would reach 26.5 million tons. Imports by China would amount to 444,000 tons, China would become a net exporter, and world imports would reach 8.3 million tons. World ending stocks would amount to 18.9 million tons, or 2 million tons lower than in the base scenario. Table 4 compares the assumed levels of mill use, ending stocks and trade in Scenario 2 with those from the Base Scenario.

Under Scenario 2, the forecast of the 2014/15 season-average A Index ranges from 54 cents to 80 cents, with a midpoint at 66 cents per pound.

Table 4. Fundamentals in 2013/14 under Scenario 2 and Base Scenario

Region	Variable	Base Scenario (in thousand tons)	Scenario 2 (in thousand tons)	Difference (in thousand tons)
China	Imports	1,944	444	-1,500
	Mill Use	7,800	9,269	1,469
	Exports	7	2,007	2,000
	Ending Stocks	11,469	6,500	-4,969
World Minus China	Imports	5,806	7,806	2,000
	Mill Use	16,774	17,274	500
	Exports	7,759	6,259	-1,500
	Ending Stocks	9,400	12,400	3,000
World Total	Imports	7,749	8,249	500
	Mill Use	24,573	26,542	1,969
	Exports	7,766	8,266	500
	Ending Stocks	20,869	18,900	-1,969

Scenario 3: Slow Release of Chinese Reserve

In this scenario, the Chinese government is assumed to liquidate reserves at prices that would result in an annual stock reduction of 1 million tons. Furthermore, it is assumed that the Chinese government would allow textile mills to import one bale out-of-quota for every three bales of cotton bought from the reserve.

It is assumed that the extra 1 million tons of cotton available from the liquidated reserves is absorbed by domestic mills, displacing 1 million tons of imported in-quota cotton. However, Chinese imports of out-of-quota cotton would increase by 56,000 tons, resulting in a net decline in Chinese imports of 944,000 tons.

Since mill use is assumed unchanged from the base scenario, the 944,000 tons not exported to China would reach ending stocks in the rest of the world. Table 5 compares the assumed levels of mill use, ending stocks and trade in Scenario 3 with those in the Base Scenario.

Under Scenario 3, the forecast of the 2014/15 season-average A Index ranges from 66 cents to 99 cents, with a midpoint at 81 cents per pound.

Table 5. Fundamentals in 2013/14 under Scenario 3 and Base Scenario

Region	Variable	Base Scenario (in thousand tons)	Scenario 3 (in thousand tons)	Difference (in thousand tons)
China	Imports	1,944	1,000	-944
	Mill Use	7,800	7,800	0
	Exports	7	7	0
	Ending Stocks	11,469	10,525	-944
World Minus China	Imports	5,806	5,806	0
	Mill Use	16,774	16,774	0
	Exports	7,759	6,815	-944
	Ending Stocks	9,400	10,344	944
World Total	Imports	7,749	6,805	-944
	Mill Use	24,573	24,573	0
	Exports	7,766	6,822	-944
	Ending Stocks	20,869	20,869	0

Scenario 4: Slowdown in World Economic Growth

In this scenario, it is assumed that world economic growth suffers a slowdown in late 2014 and early 2015 and world mill use becomes stagnant in 2014/15 (instead of growing by 3% as in the base scenario).

Assuming that Chinese government does not implement a new cotton policy for the 2014/15 season, in order to maintain domestic prices, it would have to purchase greater volumes than in the base scenario because domestic textile mills would become less price-competitive and therefore demand less cotton than in the base scenario. Thus, mill use in China is assumed at 7.05 million tons in 2014/15, or 750,000 tons less than in the base scenario.

The rest of the world would not compensate for the decline in China, and world total mill use would decline to 23.8 million tons. It is assumed that the Chinese government would import an additional 1 million tons of cotton to maintain high domestic farm prices. Table 6 compares the assumed levels of mill use, ending stocks and trade in Scenario 4 with those in the Base Scenario.

Under Scenario 4, the forecast of the 2014/15 season-average A Index ranges from 87 cents to 131 cents, with a midpoint at 107 cents per pound. Despite the counterintuitive relationship between a stagnant world demand for cotton and increasing prices, this forecast assumes that the buyer of last resort would become China. Therefore, while China increases its share of world stocks, the stock-to-use ratio outside of China falls from 56% in the base scenario to 50% in this scenario, which would cause prices to increase.

Table 6. Fundamentals in 2013/14 under Scenario 4 and Base Scenario

Region	Variable	Base Scenario (in thousand tons)	Scenario 4 (in thousand tons)	Difference (in thousand tons)
China	Imports	1,944	2,944	1,000
	Mill Use	7,800	7,050	-750
	Exports	7	7	0
	Ending Stocks	11,469	13,219	1,750
World Minus China	Imports	5,806	5,806	0
	Mill Use	16,774	16,774	0
	Exports	7,759	8,759	1,000
	Ending Stocks	9,400	8,400	-1,000
World Total	Imports	7,749	8,749	1,000
	Mill Use	24,573	23,823	-750
	Exports	7,766	8,766	1,000
	Ending Stocks	20,869	21,619	750

Concluding Remarks

As with all models, the model used by the ICAC Secretariat is limited by construction to reflect the impact of a few explanatory variables on some dependent variable. The variability of forecasts from the ICAC price model is mainly explained by the variability of its explanatory variables, in particular the projected changes in stocks and mill use outside China. Therefore, price forecasts ultimately depend on the Secretariat's forecasts of those variables.

As an attempt to better inform readers about the consequences of changes in policies or the economic environment on price forecasts, four scenarios are presented in this article: a fast release of the Chinese reserve with China remaining a net importer or becoming a net exporter, a slow release of the Chinese reserve, and a slowdown in cotton demand. Across scenarios, the role of China's cotton policy, particularly the release of its reserves, as the main driver of prices is significant. Even when China chooses a slower release of reserves, as outlined in the third scenario, the surplus of cotton on the market has dampening effect on price. It is only in the fourth scenario where China is assumed to take the surplus cotton out of the world market that we see a price increase.

Reference

Plastina, A. 2012. "Update on the ICAC Price Model," Cotton: Review of the World Situation 65(3) p.8-12.

Appendix 1. Basic Data 1970/71 through 2013/14

Season	A	X	Y	Z	ln(At/At-1)	ln(Xt/Xt-1)	ln(Yt-1/Yt-2)	ln(Zt/Zt-1)	D07	D09	D10
1970/71	31.1	41.28	20.43	97.88					0	0	0
1971/72	37.2	41.67	19.81	96.78	0.178	0.009	-0.031	-0.011	0	0	0
1972/73	42.0	45.50	22.13	90.90	0.122	0.088	0.111	-0.063	0	0	0
1973/74	76.5	44.91	32.50	91.64	0.601	-0.013	0.384	0.008	0	0	0
1974/75	52.5	64.31	34.75	97.10	-0.376	0.359	0.067	0.058	0	0	0
1975/76	65.3	43.23	43.47	96.90	0.218	-0.397	0.224	-0.002	0	0	0
1976/77	81.9	41.91	31.11	98.38	0.226	-0.031	-0.335	0.015	0	0	0
1977/78	65.1	52.13	18.49	93.16	-0.230	0.218	-0.520	-0.055	0	0	0
1978/79	76.1	46.35	8.15	89.70	0.156	-0.117	-0.819	-0.038	0	0	0
1979/80	85.4	44.74	9.82	82.34	0.116	-0.035	0.186	-0.086	0	0	0
1980/81	94.2	42.83	14.44	83.06	0.098	-0.044	0.385	0.009	0	0	0
1981/82	73.8	51.93	10.67	89.14	-0.244	0.193	-0.303	0.071	0	0	0
1982/83	76.7	49.93	15.34	94.94	0.038	-0.039	0.364	0.063	0	0	0
1983/84	87.7	39.10	51.34	100.45	0.134	-0.244	1.208	0.056	0	0	0
1984/85	69.2	51.01	124.49	104.24	-0.237	0.266	0.886	0.037	0	0	0
1985/86	49.0	61.16	91.33	112.73	-0.344	0.181	-0.310	0.078	0	0	0
1986/87	62.1	45.70	44.85	112.45	0.236	-0.291	-0.711	-0.003	0	0	0
1987/88	72.3	45.75	32.93	109.56	0.153	0.001	-0.309	-0.026	0	0	0
1988/89	66.4	43.95	26.73	100.73	-0.086	-0.040	-0.209	-0.084	0	0	0
1989/90	82.4	35.54	24.77	95.96	0.217	-0.213	-0.076	-0.048	0	0	0
1990/91	82.9	36.04	37.61	94.68	0.006	0.014	0.418	-0.013	0	0	0
1991/92	63.1	42.58	76.12	96.55	-0.274	0.167	0.705	0.020	0	0	0
1992/93	57.7	41.12	66.28	101.69	-0.089	-0.035	-0.138	0.052	0	0	0
1993/94	70.6	35.75	47.79	99.82	0.202	-0.140	-0.327	-0.019	0	0	0
1994/95	94.3	33.86	69.78	86.94	0.289	-0.054	0.379	-0.138	0	0	0
1995/96	85.6	36.81	97.55	88.62	-0.097	0.083	0.335	0.019	0	0	0
1996/97	78.6	36.88	109.30	87.21	-0.086	0.002	0.114	-0.016	0	0	0
1997/98	72.2	38.41	128.84	93.10	-0.084	0.041	0.164	0.065	0	0	0
1998/99	58.9	41.25	135.45	101.31	-0.204	0.071	0.050	0.084	0	0	0
1999/00	52.8	44.72	94.21	105.68	-0.109	0.081	-0.363	0.042	0	0	0
2000/01	57.2	45.87	71.41	100.78	0.080	0.025	-0.277	-0.048	0	0	0
2001/02	41.8	53.19	57.87	99.62	-0.314	0.148	-0.210	-0.012	0	0	0
2002/03	55.4	47.78	37.96	91.96	0.282	-0.107	-0.422	-0.080	0	0	0
2003/04	68.3	46.10	33.91	73.87	0.209	-0.036	-0.113	-0.219	0	0	0
2004/05	52.2	60.38	31.59	81.04	-0.269	0.270	-0.071	0.093	0	0	0
2005/06	56.2	55.22	42.28	56.26	0.073	-0.089	0.292	-0.365	0	0	0
2006/07	59.2	57.27	34.46	72.15	0.052	0.037	-0.205	0.249	0	0	0
2007/08	72.9	56.61	30.46	70.75	0.209	-0.012	-0.123	-0.020	1	0	0
2008/09	61.2	57.25	38.69	77.37	-0.175	0.011	0.239	0.089	0	0	0
2009/10	77.5	39.07	26.37	70.12	0.237	-0.382	-0.383	-0.098	0	1	0
2010/11	164.1	53.33	21.78	66.62	0.750	0.311	-0.191	-0.051	0	0	1
2011/12	100.0	63.62	71.58	45.39	-0.495	0.176	1.190	-0.384	0	0	0
2012/13	88	58.67	115.89	54.53	-0.128	-0.081	0.482	0.183	0	0	0
2013/14	**91**	**56.81**	**141.56**	**63.05**	**0.033**	**-0.032**	**0.200**	**0.145**	**0**	**0**	**0**

f: Forecasts as of December 27, 2013 in bold.

A_t = average value of the Cotlook A Index in current U.S. cents/pound in season t.

X_t = ending stocks as a percentage of mill use in season t for the world minus China.

Y_{t-1} = ending stocks as a percentage of mill use in season t-1 for China.

Z_t = 100 * (1- net imports into China/world imports).