2005 Beltwide Cotton Conferences, New Orleans, Louisiana - January 4 - 7, 2005

Effects of Chinese Currency Appreciation on the World Fiber Markets

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Abstract

This paper develops a partial equilibrium framework to analyze the effects of Chinese currency appreciation on world fiber markets. The unique characteristics of this model include incorporation of regional supply response of cotton, substitutability between cotton and man-made fibers and linkage between raw fiber and textile sectors. The simulation results show that appreciation of the renminbi (RMB) likely to have noticeable impacts on the Chinese fiber markets with higher fiber imports and lower prices. In addition, domestic cotton production is also projected to be lower due to lower prices. At the international level, the cotton A-index and polyester prices are projected to rise due to higher imports of cotton by China. World trade is projected to rise with United States, Brazil and Australia as the major beneficiaries in terms of higher exports.

Introduction

China's exchange rate policy has become a topic of considerable debate and international criticism in recent years. Although the Chinese renminbi (RMB) has been pegged to the U.S. dollar since 1994 at around 8.28 (Figure 1), international criticism of the currency regime was not noticeable until recently. Part of the reason is the increased job losses in the U.S. manufacturing sector and production outsourcing to other region of the world, including China. The contraction of the U.S. manufacturing sector coupled with widening U.S.-China trade deficit has intensified the criticism, with groups such as the National Association of Manufacturers urging the U.S. government to persuade China to reform its currency regime. In recent testimony before the House Subcommittee on Domestic and International Monetary Policy, Trade, and Technology, Goldstein (2003) of the Institute for International Economics indicated that undervaluation of the RMB is on the order of 15 to 25 percent. Others argue that RMB is undervalued by as much as 40 percent, thus, contributing to the widening trade deficit between the United States and China.

In his testimony to the House Subcommittee, Goldstein urged Congress to pressure China to reform its currency regime following a two-step process. First, he advocated an immediate revaluation of the RMB by 15 to 25 percent, which would widen the currency band from less than 1 percent to between 5 and 7 percent. Second, he proposed a switch from a unitary peg from the dollar to an equally weighted three-currency basket peg with the dollar, the euro, and the yen. Bowing to the growing international pressure, particularly from the United States and other large economies, China recently reported its intention to move to a market based flexible exchange rate system and is working on strengthening its banking system and liberalizing capital flows to facilitate the process.

Lau (2003) estimated that a 20% increase in the value of the RMB would increase the cost of Chinese goods by 4% but the increase in costs may not be passed on to the consumers because companies that export from China may absorb the exchange rate shift and cut profits instead. However, the effects of appreciation on agricultural trade have not been examined by past studies.

Although China is the largest cotton producer in the world, the growth in cotton mill use is rising because the expansion in the textile industry has outstripped fiber production growth and China has become the largest cotton importer in recent years. The U. S. Department of Agriculture (USDA) expects China to import more than 8 million bales in 2003/04, accounting for 25% of world cotton trade. The United States, the largest cotton exporter with more than 13 million bales, has supplied the majority of Chinese imports. In 2002/03 and 2003/04, the U.S. accounted for 62% and 53% of Chinese imports, respectively (FAS, 2004). An appreciation of the RMB is likely to affect the level of cotton imports directly and indirectly through textile exports and relative fiber prices.

The objective of this study was to determine the expected effects of Chinese currency appreciation on the world cotton market, including the United States. The analysis was done using a partial equilibrium world fiber

model. In the following sections, a conceptual framework is presented, followed by a description of the partial equilibrium model. Simulation results are reported along with discussion and policy implications.

Conceptual Framework

The conceptual analysis presented here provides the expected directional changes in the world fiber market due to appreciation of Chinese currency. As shown in Figure 2, panels (a) and (b) represent Chinese textile and cotton market respectively. Panels (c) represents the rest-of-the-world cotton market whereas panel (d) shows the market clearing mechanism at the world level by with excess supply and excess demand.

Chinese cotton demand (HJ in panel b) is derived from the textile market in panel (a). AB and CDE are the export demand and total demand for Chinese textile where total demand is a horizontal summation of export and domestic demand. China uses cotton import restrictions in the form of a tariff-rate-quota (TRQ) which imposes a higher tariff on imports above a specified quota level. As illustrated in Panel (c), the presence of a tariff-rate-quota (TRQ) on cotton imports as part of their WTO commitments[1] makes the Chinese import demand (PQRS) discontinuous at the quota level (O). The vertical line segment QR on Chinese import demand represents the level of the TRQ, below and beyond which there is a demand response by Chinese importers. This makes the world cotton price to decline to P_w and the domestic price to rise to P_d, from the free trade equilibrium level where excess supply intersects excess demand. The baseline market equilibrium of world price (P_w), domestic price (P_d) and imports (XY) corresponds to the current fixed exchange rate of 8.28 RMB per dollar.

Appreciation of RMB would make Chinese textiles and clothing expensive in the world market causing a shift in the export demand from AB to A^IB^I and total demand from CDE to CD^IE^I in panel (b). Decline in textile demand would cause a shift in the demand for cotton in mill use from HJ to H^IJ^I and in turn, shifts Chinese import demand from PQRS to $P^IQ^IR^IS^I$. At the same time, appreciation of RMB would decline import price for cotton in China causing the import demand to shift outward from $P^IQ^IR^IS^I$ to $P^{II}Q^{II}R^{II}S^{II}$. Effectively, Chinese cotton imports increase from XY to X^IY^I. Although the domestic price for cotton declines from P_d to P_{d1} due to appreciation, the higher import demand would increase the world price from P_w to P_{w1}. Depending on the degree of appreciations and supply and demand elasticities for cotton and textile it is also possible for the final import demand ($P^{II}Q^{II}R^{II}S^{II}$) to remain below the initial import demand (PQRS). Under that scenario, cotton imports will decline causing the world price to fall and domestic price to rise relative to the baseline level. In addition, the appreciation of Chinese currency may have minimal to no effect on cotton imports depending on the equilibrium position of the excess demand. If China is operating somewhere on the vertical segment "QR" where imports are constrained by out-of-quota tariff, it is possible for imports to remain in the vertical range even after appreciation resulting in no change in the world market.

Under the representation of the markets depicted in Figure 2, that is China's current imports are above the quota level, an appreciation of the RMB would lead to an increase in Chinese imports of cotton, an increase in world price, and an increase in the rest-of-the-world's production and exports. However, the magnitudes of these expected effects cannot be captured by the conceptual analysis; they are determined by the various supply and demand elasticities in these markets. Hence, this study developed an econometric model of the Chinese fiber market, which is then linked to an existing world fiber model developed by Pan et al. (2004) in order to endogenize and solve for world fiber prices.

Methods and Procedures

A structural econometric model of the Chinese fiber sector was developed to estimate the effects of the RMB appreciation on the world cotton fiber market. This model incorporates regional Chinese supply response of cotton, substitutability between cotton and man-made fibers and linkage between the raw fiber and textile sectors. As shown in Figure 3, the Chinese model includes supply, demand and market equilibrium for cotton and man-made fibers.

Domestic supply of cotton is the sum of production, imports, and beginning stocks. Production is further decomposed into areas and yields, while man-made-fiber is modeled using capacity and utilization. Cotton demand is estimated following a two-step process in which total textile fiber consumption is estimated first and followed by the allocations among various fibers such as cotton, wool, and man-made fibers.

Fiber Supply Model

Cotton-producing areas in China are divided into four regions in order to account for heterogeneity in growing conditions arising from climatic differences, availability of water and other natural resources that influence the crop mix in each of the regions. The four regions are the Yellow River or North China Plain, including Henan and Shandong, the Yangtze River region, including Jiangsu and Anhui, the Northwest, primarily accounted for by Xinjiang, and the-rest-of-China. The competing crops are different in the four regions: rice in Yangtze River, soybean and corn in Yellow river, and corn in the Northwest.

Regional production is determined by estimating separate acreage and yield equations. Acreage planted is specified as a function of lagged area, expected price of cotton and competing crops and policy variables.

$$a^c_{i,t} = f(a^c_{i,t-1}, p^c_{i,t-1}, p^s_{i,t-1}, g_{it}), \quad (1)$$

where a^c_i is the cotton acreage in the ith region, p^c_i and p^s_i are ith region cotton and competing crop prices respectively and g represents dummy variables to account for policy shifts. Regional cotton yield y_i is generally specified as a function of time to account for technological development. The total quantity of cotton produced, *CTP*, is the product of the area harvested and yield per hectare:

$$CTP_t = \sum_{i=1}^{4} (a^c_{i,t} * y_{i,t}) \quad (2)$$

Similarly, man-made fiber (synthetics and cellulosics) production is calculated by estimating capacity and utilization rate. While new capacity is generally determined by expectations formed on inputs and output market prices several periods before construction or planning actually takes place, utilization mainly depends on current prices of inputs and output. Thus, production capacity of man-made fibers is specified as lagged prices of domestic polyester price (output), oil price (input) and time trend. The lag length is determined by using minimum Akaike Information Criterion (AIC) method. The capacity equation is specified as follows:

$$MMFPC_t = f(PP_{t-i}, OP_{t-i}, MMFPC_{t-1}) \quad i = 3,4,...,7, \quad (3)$$

where $MMFPC$ is the man-made fiber production capacity; *PP* is the polyester price and *OP* is the crude oil price.

Unlike capacity, utilization depends on current input and output prices and is specified as follows:

$$MMFCU_t = f(PP_t / OP_t, MMFCU_{t-1}), \quad (4)$$

where *MMFCU* is the capacity utilization of man-made fibers

Finally, the total production of man-made fibers is calculated as:

$$MMFPR_t = MMFC_t \times MMFCU_t, \quad (5)$$

where $MMFPR$ is the man-made fiber production.

The two-step procedure for estimating fiber demand involves first estimating domestic textile production, calculated by estimating domestic textile consumption and textile net trade. In the second step, per capita domestic textile consumption in fiber equivalent is estimated as a function of per capita income and textile and food price indices. Textile net trade is estimated as a function of Chinese and the U.S. apparel price indices. In the second step, total textile production is allocated among various fibers such as cotton, wool and man-made fibers. An Almost Ideal Demand System (Deaton and Muellbauer, 1980; Segerson and Mount, 1985) structure is adopted in this step to allocate among various fibers such as cotton, man-made fibers and wool. The demand system was estimated using non-linear SUR with symmetry and homogeneity imposed. The man-made fiber equation was omitted from the estimated system and was recovered through the adding-up constraint assuming weak separability between between textile sector and the other sector of the Chinese economy.

Data and Parameter Estimates

Data for the period of 1979 to 2002 used in the estimation process were obtained from several different sources. The macroeconomic data such as GDP, population, and Consumer Price Index (CPI) were obtained from

various issues of *International Financial Statistics* published by International Monetary Fund. The price indices such as textile price index and food price index were collected from various issues of the *Chinese Statistics Yearbook*. Cotton data on acreage, yield, production, mill utilization, ending stocks, and trade were collected from the Foreign Agricultural Service of the United States. Cotton farm and mill prices were obtained from All China Federation of Supply and Marketing Cooperatives. The data on consumption and trade of textile and man-made fibers were obtained from various issues of the *China Industrial Economic Statistical Yearbook, Chinese Rural Statistical Yearbook* and *"Almanac of China's Textile Industry: 1979-99"*. Man-made fiber production capacity and utilizations were collected from various issues of Fiber Organon. Data on world cotton and polyester prices were obtained from the *Cotton and Wool Situation and Outlook Yearbook* published by the Economic Research Service, U.S. Department of Agriculture and Cotlook Ltd (2002). In this study, polyester price was used as the representative price for man-made fibers because the cellulosic sector accounts a small proportion of the Chinese man-made fiber industry. Wool price refers to the United Kingdom domestic wool 50s CIF equivalent and was collected from the International Monetary Fund.

Parameter estimates of the behavioral equations, along with the regression statistics are reported in the appendix. Table A presents the parameter estimates for the regional cotton acreage and yield equations. In all the acreage equations the price ratio of cotton and the competing crops were found to be statistically significant, suggesting that cotton acreage is responsive to both cotton and competing crop prices. In addition, a positive significant dummy for the period 1986 to 1993 (representing a fertilizer and fuel subsidy program) indicates a positive influence on cotton acreage. In the yield equations, cotton price was found to be significant only for Xiangjiang regions although all of the price parameters had the expected positive sign. Table B reports parameter estimates for man-made fiber capacity and utilization equations. The results suggest current production capacity of man-made fibers is directly affected by past petroleum prices (input) and indirectly by past man-made fibers while the utilization rate is determined by current petroleum and man-made fiber prices.

Table C shows the parameter estimates of per capita Chinese textile consumption and trade equations. Per capita income and textile price index had the expected sign and were statistically significant in the consumption equation, whereas the food price index was not significant. Similarly, relative prices of apparel in the United States and China appear to be significant in influencing the level of Chinese textile exports. In addition, a time trend was included to represent globalization and was positive and significant. In the second step, textile production is allocated among competing fibers, i.e, cotton, wool, and man-made fibers based on relative prices using AIDS model. The parameter estimates along with standard errors are presented in table D. All the parameter estimates are significant at the 5 percent level.

Finally, Table E reports the parameter estimates of cotton trade and ending stock equations. All the parameters were statistically significant and had the expected signs. For example, Chinese cotton imports are estimated to decline with the increase of the A-index price relative to the domestic price and vice-versa. Similarly, cotton price was significant and negative in the ending stock equation, suggesting that carry-over stock declines as price increases.

These parameters were converted into elasticities at the sample mean and are reported in Table F. Cotton price appears to have the maximum effect on acreage in Xinjiang region where rapid expansion in cotton acreage has been taking place in the last decade due to land availability. On the demand side, textile consumption was income elastic with an income elasticity of 1.15. At the mill level, all own-price elasticities were negative and ranged from |0.07 to |0.33, with the lowest being for wool and the highest for cotton. However, own-price elasticity of man-made fiber was similar to that of cotton (|0.32).

Policy Simulations

The estimated Chinese model was connected to the world fiber model to develop a ten-year baseline projection for cotton, man-made fibers, and textile supply, and demand and prices under a set of exogenous assumptions. Baseline projections normally assume the continuation of current policies. For example, Chinese WTO commitments are included in the baseline. In addition, the model is driven by a set of projections on macroeconomic variables, that real GDP, consumer price index (CPI), exchange rates, and population from 2004 World and U.S. Agricultural Outlook published by Food and Agricultural Policy Research Institute (FAPRI). For example, population growth is projected to increase from 0.61 percent in 2004 to 0.66 percent in 2014 (FAPRI, 2004). Similarly, China's real GDP is projected to grow at an average annual growth of 7 percent between 2004 and 2014.

With increasing population growth, the GDP growth is translated into a per capita real GDP growth rate of 6.2 percent for 2004 to 2014. Projections of other variables such as acreage, yield and prices for competing crops (wheat, rice and corn), and crude oil prices were also collected from the same source.

Once the baseline was developed alternative scenarios were run for three different levels of exchange rates that include one time appreciation of 10, 20, and 30 percent in the first year of the simulation. Tables 1 and 2 summarize the effects of appreciation on Chinese and world fiber markets, respectively. The RMB appreciation makes Chinese textiles expensive in the world market, causing Chinese cotton exports to decline. A ten percent appreciation causes Chinese textile exports to decline by an average of 4.73 percent and a 30 percent appreciation results in an annual decline of 15 percent (Table 1). Even with the decline in textile exports, appreciation makes imported cotton cheaper in the domestic market. China was projected to increase its cotton imports by four to 10 percent annually, depending on the level of appreciation; 10 percent appreciation increased Chinese cotton imports by an average of 4 percent relative to the baseline during the period of 2003/04 to 2013/14. The rise in cotton imports caused the domestic market price for cotton to decline; in the first year, 10 percent appreciation lowered domestic price by nine percent whereas a 30 percent appreciation lowered the price by approximately 25 percent. Throughout the projection period, domestic price remained lower than the baseline level. However, the extent of impacts on the domestic price steadily declined over time. Domestic cotton production was projected to decline by two to six percent in the initial years, depending on the level of appreciation. Regardless of the level of appreciation, production effects steadily weaken through time. For example, production was projected to be 0.85 and 2.40 percent lower than the baseline level in 2013/14 due to 10 and 30 percent appreciations, respectively. The decline in textile exports was somewhat offset by an expansion in domestic demand with a slight decline in cotton mill use.

Table 2 summarizes the expected effects of appreciation on the world fiber markets, including the United States and other major countries. The impact of appreciation on total cotton trade was relatively small because the increase in Chinese imports was partly offset by decline in imports by the rest-of-the-word. Overall, world cotton trade was projected to increase slightly (30 percent appreciation increased trade by only 71 thousand metric tons (one percent) in the first year of appreciation). Cotton A-index price was projected to rise by an average of 0.6 to 3.14 percent depending on the level of appreciation. In the first year, the world price would increase by 0.03 percent due to 10 percent appreciation or 1.24 percent due to 30 percent appreciation. However, unlike other variables, the effects of the RMB appreciation on world prices would strengthen over time with around 5 percent increase in 2013/14 due to 30 percent appreciation, which was mainly caused by the difference between world net cotton import and net cotton export.

Among major exporters, the Unites States, Brazil and Australia are better positioned to capture additional market share. In percentage terms, Brazil expanded its exports more than the United States and Australia. However, the United States gained the most in absolute term. On the other hand, the higher world price decreased imports by the rest-of-the-world. Among major importers, South Korea, Taiwan and Japan reduced their imports by approximately six to eight percent in the first year of 30 percent appreciation. Like other variables, the effects of appreciation on trade also declined over time. For example, a 30 percent appreciation reduced South Korean cotton imports by 7.6 percent in 2004/05 as compared to 2.5 percent in 2013/14. Other major imports affected by the appreciation include India and Pakistan; both these countries reduced their imports in response to higher prices.

Overall, appreciation of the RMB would impact the Chinese fiber markets with higher cotton imports and lower prices. In addition, domestic cotton production is also projected to be lower due to lower prices. At the international level, cotton A-index and polyester prices are projected to rise due to higher import demand for cotton from China. World trade is projected to rise with United States, Brazil and Australia as the major beneficiaries in terms of higher exports. But the extent of increase in world trade was limited because of lower demand in major importing countries such as South Korea, Taiwan, Japan, India and Pakistan.

Summary and Conclusions

This paper analyzed the effects of Chinese currency appreciation on the world fiber markets using a partial equilibrium model. Chinese component of the world fiber model was developed in this study and was connected to an existing world fiber model to conduct baseline projections and policy scenarios. Chinese model includes regional supply response of cotton, substitutability between cotton and man-made fibers and linkage between raw fiber and textile sectors. The parameter estimates of the supply side equations suggest that cotton acreage is affected by both cotton and competing crop prices. On the demand side, fiber demand was estimated in two steps. First, textile

production was derived by estimating textile consumption and trade. Second, it was allocated among various fibers based on relative prices. Textile consumption was determined by income and its own price.

Simulation results suggested that appreciation would increase Chinese cotton imports and lower textile exports. However, most of the decline in textile exports was offset by the expansion in the domestic textile consumption and resulted in slight decline in cotton mill utilization. However, the effects on the total world trade and the world price were limited due to the price effects on other main trading countries in the world. From the exporters' perspectives, Brazil, United States and Australia were well positioned to take advantage of this market expansion.

Note

[1] In-quota import levels have been set to rise from 740,000 metric tons in 2002 to 890,000 metric tons in 2004 with a tariff of one percent. The out-of-quota tariff, which was 76% above 780,000 metric tons in 2002, is scheduled to drop to 67% above 820,000 metric tons in 2003, 58% above 860,000 metric tons in 2004, 49% above 890,000 metric tons in 2005, and 40% above 890,000 metric tons in 2006.

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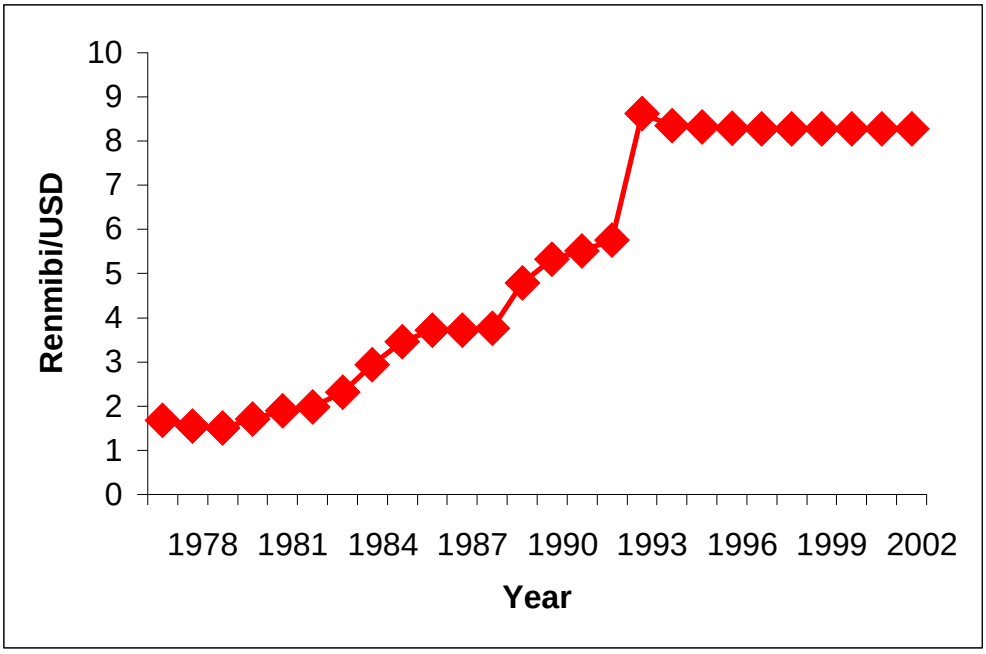
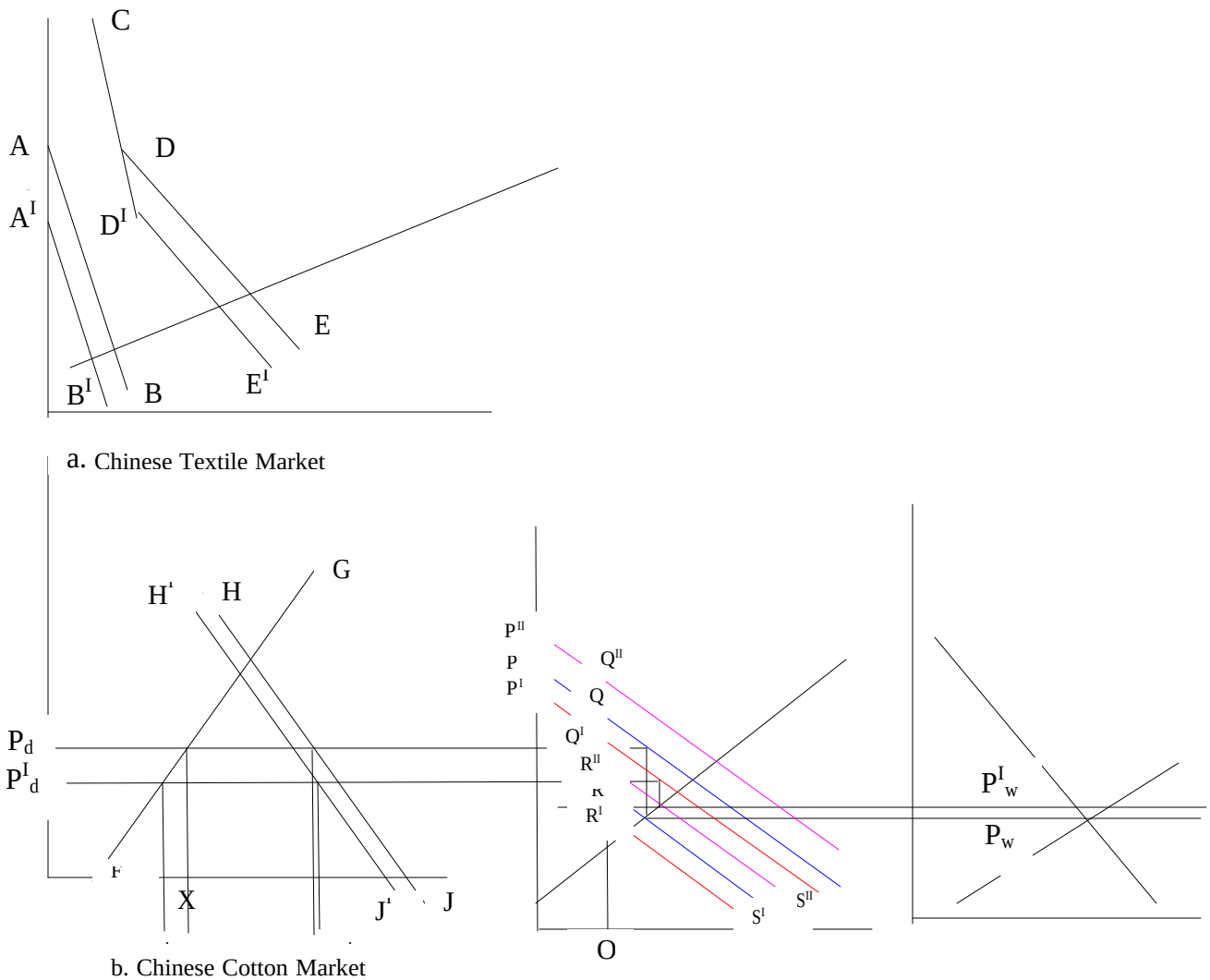
Figure 1. Evolution of Chinese Renminbi Relative to the U.S. Dollar (1978-2002)



Source: International Monetary Fund.

Figure 2. Effects of Chinese Currency Appreciation on World Cotton Market



a. Chinese Textile Market

b. Chinese Cotton Market

c. World Cotton Market

d. Rest of the World Cotton Market

Figure 3. Schematic Representation of the Chinese Fiber Model

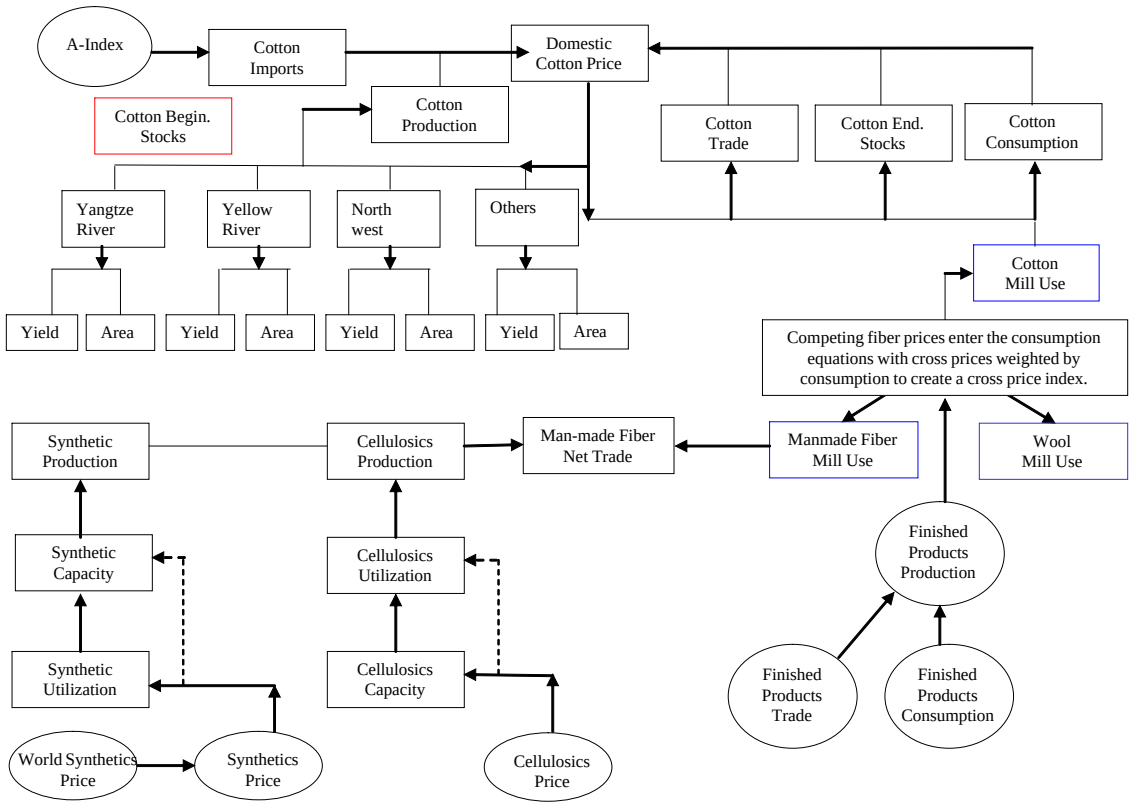


Table 1. Effects of Exchange Rate Changes on Chinese Fiber Markets

		2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
Chinese Cotton							
Imports	Base (000MT)	1400.68	1419.33	1455.79	1488.18	1508.81	1513.49
	10% Appreciated	3.57%	4.70%	4.61%	4.39%	4.23%	4.14%
	20% Appreciated	7.29%	9.41%	9.23%	8.79%	8.46%	8.28%
	30% Appreciated	10.16%	13.58%	13.34%	12.69%	12.17%	11.89%
Mill Use	Base (000MT)	6826.59	6990.67	7070.55	7175.05	7350.05	7571.92
	10% Appreciated	-0.05%	-0.42%	-0.60%	-0.50%	-0.37%	-0.26%
	20% Appreciated	-0.15%	-0.84%	-1.19%	-1.01%	-0.73%	-0.51%
	30% Appreciated	-0.47%	-1.42%	-1.95%	-1.66%	-1.23%	-0.88%
Production	Base (000MT)	5605.94	5701.59	5714.27	5757.96	5883.07	6116.94
	10% Appreciated	0.00%	-1.97%	-2.00%	-1.78%	-1.57%	-1.38%
	20% Appreciated	0.00%	-3.93%	-4.02%	-3.58%	-3.13%	-2.75%
	30% Appreciated	0.00%	-5.93%	-6.08%	-5.41%	-4.70%	-4.11%
Chinese Man-Made Fiber							
Net Import	Base (000MT)	1813.50	1906.86	1640.62	1372.02	1314.45	1227.03
	10% Appreciated	1.23%	1.34%	1.23%	1.34%	1.68%	1.93%
	20% Appreciated	2.39%	2.61%	2.39%	2.61%	3.29%	3.76%
	30% Appreciated	3.76%	4.04%	3.76%	4.04%	5.05%	5.73%
Chinese Textile (Fiber Equivalent)							
Exports	Base (000MT)	3938.01	3966.06	3967.12	3963.61	3954.45	3955.29
	10% Appreciated	-4.62%	-4.69%	-4.72%	-4.73%	-4.74%	-4.75%
	20% Appreciated	-9.60%	-9.72%	-9.77%	-9.79%	-9.80%	-9.83%
	30% Appreciated	-14.96%	-15.12%	-15.20%	-15.23%	-15.25%	-15.29%
Chinese Domestic Cotton Price							
	Base (*Yuan*/lb)	6.29	6.09	6.20	6.63	7.48	8.25
	10% Appreciated	-9.14%	-7.53%	-7.18%	-7.12%	-7.06%	-6.91%
	20% Appreciated	-17.71%	-14.90%	-14.25%	-14.08%	-13.99%	-13.68%
	30% Appreciated	-25.88%	-22.14%	-21.21%	-20.92%	-20.84%	-20.43%

Table 1. (continued) Effects of Exchange Rate Changes on Chinese Fiber Markets

		2010/11	2011/12	2012/13	2013/14	Average
Chinese Cotton						
Imports	Base (000MT)	1518.18	1519.58	1522.08	1527.50	1487.36
	10% Appreciated	4.05%	3.99%	3.90%	3.87%	4.15%
	20% Appreciated	8.08%	7.95%	7.78%	7.71%	8.30%
	30% Appreciated	11.59%	11.36%	11.12%	11.00%	11.89%
Mill Use	Base (000MT)	7820.29	8072.89	8318.72	8502.87	7569.96
	10% Appreciated	-0.17%	-0.09%	-0.03%	-0.01%	-0.25%
	20% Appreciated	-0.31%	-0.14%	-0.03%	0.02%	-0.49%
	30% Appreciated	-0.56%	-0.30%	-0.12%	-0.05%	-0.86%
Production	Base (000MT)	6351.99	6610.40	6859.58	7085.20	6168.69
	10% Appreciated	-1.20%	-1.06%	-0.90%	-0.85%	-1.27%
	20% Appreciated	-2.37%	-2.07%	-1.76%	-1.64%	-2.53%
	30% Appreciated	-3.51%	-3.04%	-2.59%	-2.40%	-3.78%
Chinese Man-Made Fiber						
Net Import	Base (000MT)	1108.35	1075.61	1036.36	1036.73	1353.15
	10% Appreciated	2.14%	2.28%	2.48%	2.62%	1.83%
	20% Appreciated	4.20%	4.46%	4.85%	5.17%	3.57%
	30% Appreciated	6.42%	6.84%	7.42%	8.01%	5.51%
Chinese Textile (Fiber Equivalent)						
Exports	Base (000MT)	3954.72	3956.16	3957.85	3977.62	3959.09
	10% Appreciated	-4.76%	-4.78%	-4.76%	-4.76%	-4.73%
	20% Appreciated	-9.85%	-9.88%	-9.85%	-9.85%	-9.79%
	30% Appreciated	-15.31%	-15.34%	-15.31%	-15.31%	-15.23%
Chinese Domestic Cotton Price						
	Base (*Yuan*/lb)	9.21	10.11	10.93	10.81	8.20
	10% Appreciated	-6.83%	-6.62%	-6.33%	-6.31%	-7.10%
	20% Appreciated	-13.56%	-13.20%	-13.10%	-13.00%	-14.15%
	30% Appreciated	-20.23%	-19.85%	-19.72%	-19.47%	-21.07%

Table 2. Effects of Flexible Exchange Rate on World Fiber Market

		2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	Average*
A-index	Base (Cents/lb)	59.87	58.92	58.28	58.98	60.49	62.43	63.19
	10% Appreciated	0.03%	0.41%	0.45%	0.48%	0.54%	0.60%	0.60%
	20% Appreciated	0.54%	1.16%	1.29%	1.28%	1.38%	1.55%	1.48%
	30% Appreciated	1.24%	1.87%	2.38%	2.64%	2.78%	2.97%	3.14%
Polyester Price	Base (Cents/lb)	55.05	55.08	56.58	56.71	59.23	61.53	61.21
	10% Appreciated	0.42%	0.82%	1.45%	1.99%	2.42%	2.92%	2.47%
	20% Appreciated	1.76%	2.58%	2.91%	3.24%	4.19%	5.38%	4.84%
	30% Appreciated	3.58%	4.02%	5.04%	5.31%	6.84%	7.09%	7.16%
World Cotton Trade	Base (000MT)	7122.54	7294.46	7459.65	7587.14	7700.98	7775.95	7695.71
	10% Appreciated	0.36%	0.51%	0.52%	0.54%	0.55%	0.57%	0.54%
	20% Appreciated	0.66%	0.94%	0.98%	1.01%	1.02%	1.05%	1.01%
	30% Appreciated	0.98%	1.32%	1.32%	1.35%	1.36%	1.40%	1.40%
Major Exporters								
US	Base (000MT)	2648.36	2596.36	2649.51	2684.23	2728.22	2717.72	2698.46
	10% Appreciated	0.66%	0.69%	0.62%	0.59%	0.59%	0.58%	0.54%
	20% Appreciated	0.97%	0.98%	0.88%	0.83%	0.77%	0.75%	0.78%
	30% Appreciated	1.61%	1.56%	1.37%	1.33%	1.28%	1.25%	1.52%
Brazil	Base (000MT)	508.17	580.33	628.60	663.90	686.57	704.44	674.16
	10% Appreciated	1.75%	2.89%	3.32%	3.49%	3.58%	3.60%	3.38%
	20% Appreciated	3.58%	5.81%	6.63%	6.64%	6.83%	6.88%	6.44%
	30% Appreciated	3.61%	5.97%	6.67%	6.85%	6.97%	7.07%	6.69%
Australia	Base (000MT)	532.82	531.45	515.89	510.72	513.12	520.93	536.41
	10% Appreciated	0.01%	0.12%	0.26%	0.42%	0.56%	0.68%	0.61%
	20% Appreciated	1.08%	1.45%	1.91%	2.33%	2.63%	1.89%	2.10%
	30% Appreciated	1.25%	1.92%	2.00%	2.86%	3.46%	3.86%	3.30%

*Note: Years 2010 through 2014 not shown due to limited space; average for all years

Table 2. (Continued)

		2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	*Average
Major Importers								
Pakistan	Base (000MT)	336.87	381.92	442.62	504.18	572.42	641.28	616.51
	10% Appreciated	-0.03%	-0.09%	-0.07%	-0.07%	-0.03%	-0.02%	-0.03%
	20% Appreciated	-3.50%	-3.53%	-2.96%	-2.48%	-2.19%	-1.92%	-2.29%
	30% Appreciated	-3.74%	-3.87%	-3.32%	-2.73%	-2.43%	-2.10%	-2.46%
India	Base (000MT)	251.63	270.55	278.81	281.88	291.55	289.35	309.90
	10% Appreciated	0.00%	-0.50%	-0.50%	-0.44%	-0.42%	-0.42%	-0.38%
	20% Appreciated	-2.66%	-3.48%	-2.52%	-2.29%	-2.15%	-2.13%	-2.22%
	30% Appreciated	-2.78%	-4.12%	-3.16%	-2.71%	-2.50%	-2.45%	-2.58%
South Korea	Base (000MT)	307.87	304.16	294.96	280.35	270.51	260.03	264.06
	10% Appreciated	-4.51%	-4.26%	-3.85%	-3.46%	-3.12%	-2.76%	-3.03%
	20% Appreciated	-6.35%	-5.88%	-5.10%	-4.28%	-3.63%	-3.27%	-3.85%
	30% Appreciated	-7.59%	-6.90%	-5.77%	-4.49%	-3.88%	-3.56%	-4.31%
Taiwan	Base (000MT)	244.87	243.32	241.63	238.15	236.02	233.96	235.77
	10% Appreciated	-3.95%	-3.94%	-3.80%	-3.68%	-3.57%	-3.45%	-3.38%
	20% Appreciated	-4.91%	-4.84%	-4.51%	-4.18%	-3.92%	-3.64%	-3.84%
	30% Appreciated	-6.32%	-6.21%	-5.71%	-5.15%	-4.72%	-4.28%	-4.60%
Japan	Base (000MT)	151.20	149.54	148.21	143.28	141.33	136.59	138.99
	10% Appreciated	-5.91%	-5.74%	-5.48%	-5.21%	-4.95%	-4.70%	-4.92%
	20% Appreciated	-6.61%	-6.37%	-6.24%	-5.94%	-5.44%	-5.16%	-5.47%
	30% Appreciated	-7.32%	-6.75%	-6.64%	-6.42%	-5.66%	-5.62%	-5.80%

*Note: Years 2010 through 2014 not shown due to limited space; average for all years

Appendix

Table A. Parameter Estimates of Regional Cotton Acreage and Yield Equations

	Xiangjiang		Yellow River		Yangtze River		Rest-Of-China	
	Area	Yield	Area	Yield	Area	Yield	Area	Yield
Intercept	-0.53**	-1.76***	1.93	0.97***	0.96	-0.75	-1.33*	0.65***
	(0.25)	(0.27)	(1.54)	(0.17)	(1.13)	(0.27)	(0.71)	(0.08)
Log(Cotton Price/Corn Price) (t-1)	0.22*	0.07*						
	(0.12)	(0.04)						
Log(Cotton Price/Weighted Soybean Price and Corn Price) (t-1)			0.21*	0.02				
			(0.17)	(0.03)				
Log(Cotton Price/Weighted Rice Price and Soybean Price) (t-1)					0.22*	0.05	0.29*	0.004
					(0.12)	(0.10)	(0.60)	(0.005)
Log(Cotton Harvested Area) (t-1)	0.99***		0.73**		0.80***		0.78***	
	(0.05)		(0.16)		(0.15)		(0.16)	
Dummy for 79-82	0.11		0.24*		0.05		-0.06	
	(0.10)		(0.12)		(0.08)		(0.35)	
Dummy for 86-93	0.10**		0.13		0.13**	0.20***	0.08	
	(0.05)		(0.11)		(0.06)	(0.04)	(0.28)	
Time Trend		0.62***		0.24***		0.03		0.29*
		(0.03)		(0.06)		(0.004)		(0.16)
Adj R^2	0.95	0.92	0.83	0.69	0.72	0.79	0.84	0.35
D-W Statistics	2.02	1.69	1.69	1.45	1.91	1.33	1.59	2.34

Table B. Parameter Estimates of Man-made Fiber Capacity and Its Utilization

	Synthetic Capacity	Utilization	Cellulosic Capacity	Utilization
Intercept	5.67***	-0.82	0.91**	2.28*
	(0.29)	(1.73)	(0.44)	(1.21)
Polyester Price (t-3 to t-7)	0.24			
	(0.24)			
Rayon Price (t-3 to t-7)			0.27***	
			(0.09)	
Oil Price (t-3 to t-7)	-0.55***		-0.07	
	(0.06)		(0.10)	
Capacity (t-1)			0.77***	
			(0.09)	
Time Trend	1.87***			
	(0.03)			
Rayon Price/ Oil Price				0.22
				(0.59)
Polyester Price/Oil Price		0.40**		
		(0.19)		
Utilization(t-1)		1.99**		3.94**
		(0.69)		(1.89)
Adj R^2	0.95	0.78	0.92	0.83
D-W Statistics	2.28	1.66	1.32	1.42

Note: Standard errors are given in brackets below the parameter estimates.

*** Significant at the 1% level; ** at the 5% level; * at the 10% level.

Table C. Parameter Estimates of Textile Consumption and Net Trade Equation

	Textile Consumption	Net Trade
Intercept	3.50***	6.34***
	(0.69)	(0.07)
log(GDP Per Capita)	1.15***	
	(0.05)	
Log(Textile Price Index)	-0.47*	
	(0.25)	
Log(Food Price Index)	0.06	
	(0.26)	
Log(Chinese Apparel Price Index/ (US Apparel Price Index*Exchange Rate Growth Rate))		-0.51***
		(0.16)
Log(Time Trend)		0.44***
		(0.07)
Adj R^2	0.81	0.85
D-W Statistic	1.56	1.90

Note: Standard errors are given in brackets below the parameter estimates.

*** Significant at the 1% level; ** at the 5% level; * at the 10% level.

Table D. Parameter Estimates of Fiber Demand System

Parameters	Cotton	Wool	Man-made Fibers
Intercept	3.67 (4.37)	-0.14 (2.01)	-2.53
Textile Outputs	-0.39 (3.8)	0.03 (2.17)	0.36
Cotton	0.11 (4.41)	-0.042 (3.29)	-0.07
Wool	-0.04	0.05 (3.34)	-0.01
Man-made Fibers	-0.07	-0.01	0.07

Note: Absolute values of t-values are reported in brackets.

Note: Standard errors are given in brackets below the parameter estimates.

*** Significant at the 1% level; ** at the 5% level; * at the 10% level.

Table E. Parameter Estimates of Cotton Ending Stock and Trade Equations

Parameters	Cotton Ending Stock	Cotton Import	Cotton Export
Intercept	-7.97***	-144.74***	5.07***
	(1.07)	(5.32)	(0.23)
World Price*Exchange rate*(1+Tariff Rate)/Domestic Price		-21.05**	
		(7.69)	
World Price*Exchange rate/Domestic Price			1.93*
			(0.99)
Domestic Cotton mill Use/Production (t-1)			-3.80***
			(1.02)
GDP per capita		7.36**	
		(3.67)	
Cotton Domestic Supply	1.88***		
	(0.12)		
Cotton Domestic Price	-0.89**		
	(0.4)		
Adj R^2	0.86	0.75	0.81
D-W Statistics	1.79	1.87	1.96

Note: Standard errors are given in brackets below the parameter estimates.

*** Significant at the 1% level; ** at the 5% level; * at the 10% level.

Table F. Chinese Fiber Elasticities

		Price Elasticities		
		Cotton	Man-made Fiber	
Supply Side				
Cotton Acreage Response				
Yellow River		0.11		
Yangtze River		0.10		
Northwest		0.20		
Man-made fiber Production				
Synthetic			0.36	
Cellulosic			0.14	
Demand side	Income Elasticity			
Textile Fiber Consumption	1.15			
		Cotton	Man-made Fiber	Wool
Cotton		-0.33	0.38	-0.05
Man-made Fiber		0.28	-0.32	0.04
Wool		-0.33	0.40	-0.07