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Risk Management Prospects for Egyptian Cotton

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The New York futures market does not provide an appropriate mechanisms for hedging the price risk in Egyptian cotton under present procedures for determining prices. Establishing a domestic spot market (while privatizing the industry), followed by a forward market, may provide the best interim mechanism.

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This paper — a product of the International Trade Division, International Economics Department — is part of a larger effort in the department to explore possibilities for commodity risk management in developing countries. Copies of the paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Dawn Gustafson, room S7-047, extension 33714 (January 1993, 26 pages).

Varangis, Thigpen, and Akiyama examine risk management options for Egyptian cottons, the export prices for which are volatile. They use regression analysis to establish whether Egyptian cotton's prices can be effectively hedged by using existing futures contracts on the New York Cotton Exchange.

They find no relationship between the movements in prices of Egyptian long and extra-long cottons and prices for the base quality of U.S. medium staple cotton traded on the New York futures market. (Probably because Egyptian cotton prices are government-determined, U.S. medium staple cotton prices are influenced by price support policies unrelated to the longer staple markets, and the fiber of the cottons analyzed have different physical characteristics.)

So, the New York cotton futures market's No. 2 contract is not an appropriate mechanism for hedging the price risk facing Egyptian cotton under present procedures for determining prices — and probably not under market-determined prices.

If the cotton market in Egypt is liberalized, cotton prices there may correlate more with prices elsewhere — especially for the longer staple cottons.

Varangis, Thigpen, and Akiyama extend their regression analysis to the prices of other medium staple cottons — Australian, Central Asian, Mexican, Pakistani, and Turkish — to determine how they behave relative to U.S. medium staple cotton prices. None of these prices had short-term movements closely related to U.S. cotton prices, indicating mainly the influence of domestic policies on the U.S. market. Again, the New York futures No. 2 contract does not provide a satisfactory hedge for these cottons.

The cotton futures contract recently introduced in New York (world cotton contract) — based on the Cotlook A Index — may prove useful for hedging the price risk for some cottons (especially Australian, Central Asian, and Pakistani) but apparently not Egyptian cotton.

Varangis, Thigpen, and Akiyama recommend (together with privatizing the industry) establishing a domestic spot market to give transparency to the price-forming process. When the spot market is functioning well, establishing a forward market could provide a hedging instrument for Egyptian cotton.

RISK MANAGEMENT PROSPECTS FOR EGYPTIAN COTTON

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RISK MANAGEMENT PROSPECTS FOR EGYPTIAN COTTON

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Introduction

This paper examines risk management possibilities for Egyptian cottons. Risk management is important given that the volatility of export prices for Egyptian cotton is high. The coefficient of variation is between 18.6% and 23.4%, depending on the cotton variety, while the average for all primary commodities is between 17% and 19%.[1] Three questions arise with respect to risk management: first, can Egyptian cottons be hedged using the existing cotton contract in New York? If the answer is negative, can Egyptian cottons be hedged using a futures contract representing other cottons such as Turkish, Pakistani or Central Asian cottons? Third, if price movements of Egyptian cotton are uncorrelated with prices of other cottons, what is the possibility of establishing a cotton futures contract(s) representing Egyptian cotton varieties? The paper investigates these questions.

The structure of the paper is as follows: the first section describes the market for Egyptian cottons and for other extra-fine cottons. It also describes the characteristics and structure of the cotton market in Egypt. The second section presents an econometric analysis of the relationship between the movements of the prices of Egyptian and other cottons. This section offers answers to the first two questions above. Section three discusses the results of the above analysis and assesses the implications for hedging options. Section four deals with the feasibility of establishing a cotton exchange for spot and futures transactions. It describes the constraints facing the establishment of a successful futures contract for Egyptian cotton, as well as presenting some ideas of how a spot market could operate. Section five concludes.

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[1]The coefficient of variation is measured as the standard error of the regression of the price on its time trend.

I. Characteristics of the Egyptian Cotton Market

The Egyptian cotton market operated actively under free market conditions prior to the socialist revolution in the early 1950s. During the pre-revolution period an active physical spot market for cotton was in operation in Alexandria. It was maintained briefly in the post-revolution period but became inoperative due to heavy government interference. During the pre-revolution period, Egypt was the world's principal producer and exporter of extra-long and long staple cotton. It accounted for over 70% of world production and exports in these cottons.

In Egypt, cotton is typically produced on small owner-operated farms. Cotton growing has been limited to 33% of total crop land and farmers have been required, by law, to plant a specified area to cotton. However, the cotton area has now declined to around 13.3% of the total crop area. The Government determines the area to be planted, the cotton crop rotation, and the variety which farmers in a given locality may grow. It also buys seedcotton from farmers at procurement prices set annually. Cotton procurement prices are proposed by the Ministry of Agriculture and approved by the Higher Policy Committee which represents the main ministries.

The Egyptian Holding Company for Cotton, formerly the Egyptian Cotton Authority, in the Ministry of Economy and Foreign Trade controls cotton marketing, ginning, and exports. The Cotton Authority exercises these functions through supervision of six export companies, five ginning companies, and a cotton press/baling plant, all of which are public sector organizations. After harvest, farmers deliver their seedcotton to village cooperative collection centers. Seedcotton is transported from there to a nearby gin. Farmers are paid on the basis of lint classification after deduction of ginning, transportation, and cooperative costs. Until recently, the price received by farmers was equivalent to

about 50% of the world price. Under the recent economic reform program, cotton producer prices have been raised to 66% of world prices.

Cotton lint is classified by the Cotton Arbitration and Testing General Organization against maintained standards according to variety, grade, and type. The quality classification system for Egyptian cotton contains as many as 16 grades, but currently the export pricing system includes prices for only seven grades of the Giza 45 variety and for only the five top grades of all other varieties.

After ginning, cotton lint is allocated to export companies for sale to foreign buyers and to government-owned spinning mills by the Ministry of Economy and Foreign Trade, in consultation with the Textile Industries Corporation, now also a holding company, and the Ministry of Industry and Mineral Wealth. Allocations are based on the size of the crop, domestic mill requirements, cotton imports, Egypt's need for foreign exchange, and international prices. Cotton export prices are set by the Ministry of Economy and Trade and the Cotton Authority, based on an assessment of world market conditions. When prices are announced, bids are invited from foreign buyers. Domestic spinning mills buy lint at highly subsidized prices, which are usually equivalent to or lower than prices received by farmers.

The Textile Industries Corporation (TIC), a public sector holding company, has a virtual monopoly on cotton yarn production and controls around 90% of the weaving industry. It has 30 large, mostly vertically integrated enterprises under its direction. The installed capacity in the spinning mills consists of three million ring spindles (design capacity of 3 million tons/year) and 25,000 rotors (design capacity of 40,000 tons/year). The TIC has a monopoly on all cotton procurement for domestic use.

Under the ongoing economic reform program, the Government has undertaken significant steps towards liberalizing the cotton sector. The basic framework of the reforms includes: (a) unification of the exchange rate at the commercial rate; (b) gradually increasing input prices to reach economic levels within a specified time period; (c) gradually lifting import bans and reducing the number of banned commodities; (d) revising the tariff code; (e) removal of informal trade restrictions; and (f) assurance that public and private enterprises face the same incentives.

Egypt's cotton production accounts for only about 2% of the world total and its share of world output of extra-fine cottons (extra-long and long staples) has declined to less than 30% during the last three seasons. Due to the desirable qualities of these cottons for manufacturing high-value products, they command premium prices in world markets relative to other cottons. Moreover, prices for these cottons appear to change in response to supply and demand for these specific qualities and to be little affected by changes in prices for medium staple cottons.

Egypt has had a long tradition of growing and exporting a major share (about 40%) of the world's longest and finest cottons. Only after the late 1970s has extra-fine cotton produced outside the Nile River Valley challenged Egyptian cottons in a major way (Tables 1 and 2). Peru has produced extra-fine cotton for many years, but since 1970 output has fluctuated widely, while only occasionally exceeding 30,000 tons. Historically, India and the former Soviet Union (FSU) were major importers of extra-fine cotton but since 1986/87, having developed their own production capabilities, they are exporters of these cottons. China has increased its production of extra-fine cotton in recent years, from 15,000 tons in 1986 to 60,000 tons in 1990. Some of this cotton is offered for export. Israel's production of extra-fine Pima cotton fluctuates in response to the availability of irrigation water and the relative prices of Pima and upland cottons. Its output is virtually all exported. The most important competitors for Egyptian cottons in export markets have been Sudanese Barakat (until recently) and United States Pima (since 1989/90).

Its characteristics of fiber fineness and strength make extra-fine cotton desirable for spinning the highest quality combed cotton yarns. Such yarns are used for producing fine apparel fabrics, laces, embroidery fabrics, knitted goods, household fabrics, and strong industrial cloths. The unique qualities of extra long staple (ELS), and to a lesser extent long staple (LS) cottons, limit the competition faced by Egyptian cottons to a few select extra-fine fiber cottons that account for a small proportion of world cotton production (5.3% to 7.5% in recent years).

Table 1: PRODUCTION OF EXTRA-FINE COTTON 1986 TO 1990
('000 Tons)

Country/Year	1986	1987	1988	1989	1990
China	15.0	25.2	25.0	35.1	60.0
Israel	16.0	12.5	18.5	31.2	15.5
Peru	28.1	10.7	23.0	32.6	26.8
Sudan	73.1	42.4	40.5	49.1	14.2
United States	44.8	62.0	72.8	150.7	78.9
India	254.6	217.6	191.2	213.1	194.0
FSU	313.0	371.0	390.1	264.0	318.0
Others	10.1	12.8	10.8	11.0	14.1
Egypt, ELS	109.3	82.5	80.6	80.8	82.7
Egypt, LS	288.3	265.2	226.2	204.2	209.3
World Total	1152.3	1101.9	1078.7	1071.6	1012.8
Extra-Fine's Share of World Cotton (%)	7.5	6.2	5.9	6.2	5.3
Egypt's Share of Extra-Fine Prod. (%)	34.5	31.6	28.4	26.6	28.8

Source: Cotton World Statistics, ICAC, April 1992

Synthetic fiber yarns are suitable for some extra-fine cotton uses and have made serious inroads into former all-cotton products.[2] The extremely high prices for extra-fine cotton during recent seasons and competition from synthetics, in thread and fabric manufacturing have reduced import demand for cotton. Therefore, world exports have declined from their rather stable level of 373-387,000 tons per year during the period from the early 1960s to the mid 1970s to an average of 275,000 tons during the 1987-90 period (Table 2). Moreover, in recent seasons, a substantial shift has occurred in the export supply of extra-fine cotton. The declining exports of Egypt and Sudan have been replaced by other producers, particularly the United States. Egypt's export supply of extra-fine cotton has diminished due to declining production and domestic mills taking an increasing share of output.

Since the extra-fine cottons are, in a sense, a specialty fiber, they are employed in manufacturing in a specialized sector of the general textile industry and many countries do not manufacture these cottons. The number of countries that import these cottons in significant quantities is even more limited because several consuming countries fill their own needs--such as India, the Commonwealth of Independent States, and the United States. The major importers of fine cottons are Western Europe and Japan.

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[2]Even in extra-fine cotton's largest end-use--sewing thread--synthetic monofilament is used as a core of the thread to add strength. The synthetic's weakness in this use of a low melting point is overcome by wrapping the thread's synthetic core with cotton yarn to protect the synthetic component from the high temperature generated in high-speed industrial sewing operations.

Table 2: WORLD EXTRA-FINE COTTON EXPORTS BY ORIGIN 1987/88 TO 1990/91

('000 Tons)

Country	1988/87	1988/89	1989/90	1990/91
Egypt	87.7	60.0	43.0	18.0
United States	51.6	57.7	98.4	90.4
Sudan	63.1	52.5	32.9	27.7
FSU	47.5	56.5	31.6	7.8
India	NA.	NA.	25.5	3.6
Israel	12.5	18.0	30.5	14.2
China	21.8	13.0	8.2	10.0
Peru	2.5	11.1	10.1	20.7
Others	11.3	13.8	7.5	11.7
Total	298.2	282.6	287.6	204.0

Notes: Egyptian exports are for ELS and LS cotton combined.
The cotton season begins August 1 of the year designated.
NA indicates data is not available.

Source: Cotton World Statistics, ICAC, April 1992.

II. Relationships Between Cotton Prices

We employed regression analysis to establish whether fluctuations in Egyptian cotton prices (ELS and LS) can be hedged using the New York cotton futures market. With the regression analysis we sought to establish whether the price changes in Egyptian cotton could be explained by changes in US cotton prices. We regressed the logarithmic difference of each of the Egyptian cotton prices on the logarithmic difference of the US cotton price. We used the logarithmic difference because these price series are non-stationary.[3] For hedging purposes, the differences in the price levels do not matter; what matters is whether price movements in the Egyptian and US cottons are closely related. The US cotton price analyzed is for grade 41, staple 34 (medium staple) cotton. We chose this quality because it is the base quality for the New York No. 2 cotton contract and, thus, the New York cotton futures' price has to follow this spot price closely. If prices for other cottons move closely with the US cotton price, the New York cotton futures contract can be used for hedging the price risk of these other cottons.

The results of the regression analysis are presented in Table 3a. No relationship was found between the Egyptian ELS and LS cotton price movements and movements of the US medium staple cotton price. The R-squares are zero and the coefficients are statistically insignificant. Therefore, the N.Y. cotton futures market's No. 2 contract is an inappropriate mechanism for hedging the price risk of Egyptian cotton. There are two plausible explanations for the lack of a significant relationship between the prices of these cottons. First, Egyptian cotton prices are determined by government policies and, thus, their movements are unrelated to cotton prices determined in the US market.[4] Second, the technical

[3]Non-stationarity implies that regressions in levels (or log levels) may be of a spurious nature (Phillips, 1986). This implies that neither the parameter estimates nor their standard errors should be tested. To avoid this problem, regressions should employ differenced or log-differenced non-stationary data.

[4]See Monke (1981).

characteristics of Egyptian ELS and LS cottons are greatly different from those of US medium staple cotton, and they do not substitute for each other in the manufacture of cotton textiles. Therefore, their prices are formed under different supply/demand conditions.

Similar regression analysis was performed on the movements of prices of American Pima cotton and the prices of US medium staple cotton. Since American Pima cotton is substitutable for some qualities of Egyptian cottons and its export price is determined in the international market, a significant relationship between the prices for American Pima and US medium staple cotton would hold some promise for hedging Egyptian cotton on the N.Y. futures market once the Egyptian cotton market is privatized and the impact of government intervention on the prices of Egyptian cottons is absent. However, the regression analysis (Table 3a) does not reveal any relationship between Pima and US medium staple cotton price movements. This result indicates that the present contract at the N.Y. futures market is not appropriate for hedging Pima cotton, nor would it be useful for hedging Egyptian cotton price risk in a liberalized market.

If price movements are not close from month to month, are there market forces that at least pull them together in the long run? This question can be analyzed using tests for cointegration. Cointegration examines whether there exists a long-run stationary relationship between two or more variables. It can also be considered as a test for market integration. That is, in Section I we saw that Egyptian cottons have different characteristics than other, medium staple, cottons. The question is, are these differences enough to imply market segmentation in cotton? The results of the tests for cointegration between prices of Egyptian cottons, pima cotton, and US medium staple cotton are shown in Table 4. These tests reject the hypothesis of a long-run relationship between the two Egyptian prices and the US medium staple cotton price. However, such a relationship between Pima and US medium staple cotton prices cannot

be rejected, at least at a 90% level of significance. Hence, over the long run Pima and US cotton prices tend to move together. It appears that market forces, such as substitutability in production, tends to pull these prices together in the long run (between seasons), even if their prices diverge in the short run (within seasons). Such a relationship does not hold between Egyptian cotton prices and US medium staple cotton prices. It is important to note that for hedging purposes, the month-to-month relationship matters. Cointegration tests are used to see whether there is a broader, long-run relationship between prices. These latter tests give an indication of the extent of integration of the world cotton market.

We extended the regression analysis to see how other cotton prices behave vis-a-vis the US cotton price. We chose medium staple cottons of comparable quality from Pakistan, Turkey, Central Asia[5], Australia and Mexico. The results showed that none of the five prices investigated moves closely with the US grade 41, staple 34 cotton price, indicating the influence of domestic policies and US weather conditions on the US market.[6] All R-squares are quite low. Hence, the New York futures contract provides an unsatisfactory hedge for all of these cottons. The strongest short-run price relationships were found between the Central Asian, Mexican, Pakistani, Australian and Turkish cottons. However, the cointegration tests performed indicated the existence of long-run relationships between each of these prices and the US cotton price (although it was not as strong for the Australian cotton as for the others).[7] In summary, the cointegration test results show that all cotton prices, except the Egyptian, tend to move together in the long-run.

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[5]Until recently, the Cotton Outlook called this cotton "Russian".

[6]The impact of the US Government intervention is somewhat predictable by market participants. The US Government affects the market mainly through subsidies to reduce export and domestic prices when they exceed a certain level, limits on acreage and the loan programs, while all these instruments can make US prices diverge from other cotton prices in the European market, they do not impede the functioning of a futures contract. Although, they may limit the use of cotton futures contracts.

[7]Note that transitivity holds in cointegration. If X is cointegrated with Y and Y with Z, then X is cointegrated with Z.

The analysis described above suggests that the New York cotton futures can be used to hedge only the medium staple US cotton varieties. This can explain why the New York cotton futures market is used primarily by US traders, textile mills, and cotton growers, and less frequently by foreign interests. In other commodities, such as coffee, cocoa and crude oil, futures contract in New York are commonly used by foreign producers and consumers.

The recent introduction of a cotton futures contract in New York based on the Cotton Outlook "A" Index may prove to provide an acceptable hedge for a number of cottons. We employed the same regression analysis as before to explore this issue. Table 3b shows that the Cotton Outlook "A" Index (CLAI) can provide an adequate hedge for the Pakistani, Australian and Central Asian cottons, but is less suitable for the Mexican and particularly the Turkish cottons. As is the case with other cottons, CLAI is poorly correlated with either the ELS or the LS Egyptian cotton prices. Furthermore, it was found to be poorly correlated with Pima cotton prices. The CLAI movements are also not closely related the movements in US grade 41, staple 34 spot prices. So the introduction of the CLAI cotton futures contract does not appear to be suitable for hedging the long fine cottons such as Egyptian and Pima varieties.

Finally, we tested the relationship between Egyptian cottons and the Turkish and Central Asian cottons. If a relationship exists, the establishment of a regional futures contract could be to the mutual benefit of the cotton sectors in these countries. However, the regression analysis indicates that there is no short-run (month-to-month) relationship between these prices. Nor does the cointegration tests show that there is a long-run relationship.

Another way to look at the relationship between prices is to comput. the correlation coefficients (CC) between pairs of prices.[8] However, because the price levels are non-stationary it is not appropriate to compute the CCs on their levels, rather it should be done on their percent differences. Table 5 presents the computed CCs for the period 1985 to 1991, using monthly data.[9] The CCs that were found highly statistically significant are those between the Central Asian, Turkish, Australian, Mexican and Pakistani cottons. The US cotton (spot) relationship with the Australian, Pakistani, Mexican and Central Asian cottons was also significant. The weakest relationship was found between the Egyptian cottons and Pima with every other cotton price in our sample. The relationship between the two Egyptian cottons, ELS and LS, is significant. These results are consistent with those obtained from the regression analysis.

[8]Regression analysis looks at the same short-run relationship as the CC. Cointegration tests investigate long-run relationships.

[9]The statistical significance of the CC is computed by multiplying the CC by the number of observations. The computed statistic is distributed at X^2 (1). In our case, each CC should be multiplied by 72 and the critical value of the X^2 (1) is 3.84 at the 95% level of significance.

III. Explanation of the Statistical Results

The independent movement of prices for US medium staple and Egyptian extra-long staple cottons is as expected. Those two types of cotton are not substitutable in their primary uses. Moreover, the price of each is influenced by independent domestic cotton policies that address different market situations. Monthly price movements are also affected by dissimilar seasonal marketing patterns. During several recent seasons, the export supply of Egyptian ELS cotton was quite limited and its sales were typically allocated to traditional users at prices determined by the Egyptian Government. The marketing season was short--often no more than one or two months--and prices during the remainder of the season were of no informational value, being set at levels near those at which earlier sales took place. By contrast, price movements of US medium staple cotton appeared to be the result of changes in supply and demand in the domestic and export markets during the entire year. The Egyptian ELS and LS cotton prices moved together mainly because the Government of Egypt tended to set a fixed differential between them each season.

The weakness of the relationship between prices for US Pima cotton and US medium staple cotton basically reflects their lack of substitutability in manufacturing uses. The area planted to Pima cotton does appear to be largely determined by the relative prices of Pima and medium staple cotton. However, this is an annual decision and has only a limited influence on monthly price movements within a season. Therefore, the number 2 contract on the New York Cotton Futures Market, based on medium staple US cotton, is not a satisfactory price hedging mechanism for either US Pima or for other cottons that compete with US Pima in international markets.

The divergence of monthly cotton export price movements for four medium staple cottons from major exporting countries relative to US domestic medium staple cotton prices are related to divergent domestic cotton policies. The US market for raw cotton is largely insulated from foreign supplies due to import restraints which are relaxed only in periods of very tight supply. Cotton exports from Pakistan, Turkey, and Central Asia were closely controlled during the early parts of the seasons being analyzed to assure supplies to domestic mills. Various governmental agencies implemented quotas or variable tax rates on cotton for export.

The regression results indicated a relatively strong relationship between the short-term movements of export prices of medium staple cottons from Australia, Central Asia, Mexico, Pakistan, and Turkey. This is an expected result since these prices represent the offer rates of cottons of similar quality in the world's largest importing region--Western Europe--under very competitive conditions. An important implication of this result is the possibility of operating a successful regional cotton futures market for hedging purposes. The necessary volume for such a market could potentially be provided by production in Central Asia, Pakistan and Turkey.

Despite the low correlation between the short-run price movements of US and other cottons, a strong long-run relationship exists due to their close substitutability in the manufacture of cotton textile products and the competitiveness of cotton transactions in import markets. The slightly weaker relationship between the monthly price movements for US and Australian medium staple cottons over the long-run could be related to the differing seasonal patterns for marketing crops grown in the northern and southern hemispheres.

Table 3a: REGRESSION RESULTS[10]

Variables	Coeff.	t-stat	R^2	D.W.	SER
		PERIOD 1983 M9 - 1991 M7			
ELS, SPOT	-0.00	-0.07	0.00	1.98	0.04
ELS, PIMA	0.06	0.91	0.01	2.02	0.04
LS, SPOT	-0.00	-0.02	0.00	1.14	0.04
LS, PIMA	0.07	1.05	0.01	1.99	0.04
PIMA, SPOT	-0.01	-0.28	0.00	1.56	0.04
ELS, LS	0.88	21.40	0.83	1.94	0.02
		PERIOD 1981 M9 - 1991 M7			
PAK, SPOT	0.25	4.77	0.16	1.20	0.06
IZMIR, SPOT	0.12	2.12	0.04	1.49	0.06
MEX, SPOT*	0.16	2.81	0.13	1.65	0.06
AUS, SPOT	0.15	2.91	0.10	1.22	0.05
RUS, SPOT*	0.18	3.08	0.13	1.03	0.06
LS, IZMIR	0.09	1.44	0.02	1.93	0.04
ELS, IZMIR	0.09	1.45	0.02	1.94	0.04
ELS, RUS*	-0.02	-0.23	0.00	2.03	0.04
LS, RUS*	-0.02	-0.23	0.00	1.99	0.04
PAK, IZMIR	0.53	6.45	0.26	1.37	0.05
RUS, IZMIR*	0.43	4.05	0.21	1.17	0.06
RUS, PAK*	0.78	14.05	0.75	1.77	0.03
AUS, PAK	0.68	12.74	0.73	2.18	0.03
AUS, IZMIR	0.39	4.06	0.21	1.34	0.05
AUS, RUS*	0.81	14.21	0.77	1.77	0.03
MEX, AUS*	0.68	8.89	0.53	1.82	0.04

Notes: ELS refers to Egypt's Menoufi/Giza 70 extra long staple cotton; LS refers to Egypt's Dendera/Giza 69/81 long staple cotton; SPOT refers to United States grade 41 staple 34 cotton which is the representative price in the New York exchange; PIMA refers to American pima G3 1-7/16" extra long staple cotton; PAK refers to the Pakistani Sing/Punjab cotton; IZMIR refers to the Turkish Izmir ST 1 white 1-3/22 RG cotton; MEX refers to the Mexican middling 1-3/32 staple cotton, and AUS refers to the Australian middling staple 1-3/32" cotton; RUS refers to Central Asian (formerly referred to as Russian) Vtoroi, medium staple cotton. All prices are in US cents per pound, CIF North Europe.

* Regressions with Central Asian and Mexican cottons were for the period 1985 M9 to 1991 M7.

[10]The regression is of the form $Y_t = a_0 + a_1 * X_t + u_t$, where Y_t is the log difference of the first variable in the column of variables, X_t is the log difference of the second variable, a_0, a_1, are coefficients and u_t is the error term. The column coefficient refers to the value of a_1 and the next column, t-stat, refers to t-statistic for a_1. D.W. stands for the Durbin-Watson statistic for serial correlation and SER is the standard error of the regression.

Table 3b: REGRESSION RESULTS FOR COTLOOK - A INDEX AND OTHER COTTON PRICES PERIOD 1981M9 - 1991M7

		Coeff.	t-Stat	R^2	D.W.
ELS	A INDEX	0.06	0.81	0.01	1.97
LS	A INDEX	0.06	0.74	0.01	1.94
IZMIR	A INDEX	0.60	6.25	0.25	1.76
PAK	A INDEX	1.07	18.50	0.75	2.02
RUS	A INDEX	1.00	19.27	0.84	1.48
AUS	A INDEX	0.86	14.05	0.74	2.07
MEX	A INDEX	0.63	7.74	0.46	2.05
SPOT	A INDEX	0.86	5.20	0.19	2.23
PIMA	A INDEX	0.02	0.21	0.01	1.56

See notes at the bottom of Table 3.

Table 4: COINTEGRATION TEST RESULTS

Variables	DF	ADF
ELS, SPOT	-1.23	-1.02
ELS, PIMA	-0.99	-1.10
PIMA, SPOT	-1.57	-2.75*
LS, SPOT	-0.31	-0.27
PAK, SPOT	-3.20**	-3.00*
IZMIR, SPOT	-3.51**	-3.21**
PAK, IZMIR	-4.19**	-4.68**
RUS, SPOT	-3.00**	-2.94*
AUS, SPOT	-2.86*	-2.71*
MEX, SPOT	-2.74*	-3.56**
ELS, IZMIR	-1.17	-1.28
LS, IZMIR	-0.40	-0.44

* Significant at the 90% level.
** Significant at the 95% level.

Table 5: CORRELATION MATRIX OF COTTON PRICE MOVEMENTS

	dLELS	dLLS	dLPIM	dLSPOT
dLELS	1.000	0.950	0.086	-0.014
dLLS	0.950	1.000	0.081	-0.007
dLPIM	0.086	0.081	1.000	-0.038
dLSPOT	-0.014	-0.007	-0.038	1.000
dLPAK	-0.061	-0.040	-0.120	0.401
dLIZM	0.017	0.035	-0.055	0.180
dLRUS	-0.027	-0.028	-0.079	0.354
dLAUS	-0.073	-0.062	0.017	0.320
dLMEX	-0.003	-0.006	-0.122	0.339
dLAOUT	-0.018	-0.012	-0.079	0.404
	dLPAK	dLIZM	dLRUS	dLAUS
dLELS	-0.061	0.017	-0.027	-0.073
dLLS	-0.040	0.035	-0.028	-0.062
dLPIM	-0.120	-0.055	-0.079	0.017
dLSPOT	0.401	0.180	0.354	0.320
dLPAK	1.000	0.539	0.864	0.844
dLIZM	0.539	1.000	0.446	0.459
dLRUS	0.864	0.446	1.000	0.854
dLAUS	0.844	0.459	0.854	1.000
dLMEX	0.777	0.545	0.716	0.730
dLAOUT	0.892	0.500	0.918	0.860
	dLMEX	dLAOUT		
dLELS	-0.002	-0.018		
dLLS	-0.005	-0.012		
dLPIM	-0.122	-0.079		
dLSPOT	0.339	0.404		
dLPAK	0.777	0.892		
dLIZM	0.545	0.500		
dLRUS	0.716	0.918		
dLAUS	0.730	0.860		
dLMEX	1.000	0.681		
dLAOUT	0.681	1.000		

NOTES: The prefix dL signifies logarithmic difference. ELS and LS are the two Egyptian cottons. PIM is the US pima cotton, SPOT is the US 41,34 medium staple cotton, PAK is the Pakistani cotton, IZM is the Turkish, RUS is the Central Asian (formerly Russian), AUS is the Australian, MEX is the Mexican and AOUT the Outlook A index. For a precise description of each of the series see the notes of Table 3a.

Correlation coefficients higher than 0.07, in absolute terms, are statistically significant at the 95% level of significance.

V. Issues in Establishing an Egyptian Cotton Exchange

Given the weak relationship between the short-run price movements of the Egyptian (ELS, LS) cottons and the US cottons, Egyptian cottons cannot be hedged using the New York cotton futures market. Thus, the question arises whether there is room for the creation of an Egyptian cotton futures exchange? The Government of Egypt (GOE) is currently considering re-opening the Cotton Exchange in Alexandria which was closed in the early 1950s. This would be part of a program to liberalize and privatize the cotton industry. GOE has plans for the Cotton Exchange to offer services in futures as well as in spot market transactions.

The main benefit to Egypt of establishing such an exchange is that it would determine prices for Egypt's high quality cotton in a transparent and competitive manner. At present, prices for Egypt's cotton are set by the Ministry of Economy and Trade and the Cotton Authority based on an assessment of factors including world market conditions, the size of the crop, domestic mill requirements, cotton imports, and Egypt's need for foreign exchange. Egypt's cotton export prices have been set at very high levels in recent years and, although short-term demand is inelastic, the high prices helped to dramatically reduce export volumes.

For a futures market to operate effectively, there are a number of conditions that must be met.[11] Probably the five most important are: (a) a well established physical market;[12] (b) clear and appropriate trading rules and the establishment of a well-functioning clearing house; (c) freedom from government intervention; (d) adequate liquidity, i.e., large numbers of users and high volumes; (e) confidence in

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[11]For a general and extensive discussion on these conditions see Leuthold (1992).

[12]A well established physical market is one where prices are transparent and determined competitively.

standardized grading; and (f) support of the commodity business community. Because of difficulties in satisfying these conditions, futures markets in various commodities have failed.

The basic functions of a futures exchange is to develop, publish and enforce the rules of trading. The rules of trading and their enforcement aim at making the system trustworthy and thus encouraging the participation of traders.[13] Any systematic attempt to influence prices via controls on the sector will damage the trust traders place in the functioning of the futures market. An example is the intervention of the US Government in commodity exchanges during the 1960s. Through price support and stocking policies, the US Government controlled US cotton prices and the traders' interest in the cotton futures market diminished to the point where the New York cotton futures contract did not have the needed liquidity and became almost ineffective.

The issue of liquidity is very important. Liquidity assures buyers and sellers of futures contracts that when they wish to enter the market there will always be someone willing to sell to them or buy from them. Note that for a futures market to be successful, it has to attract not only physical traders, as in the case of a spot market, but also speculators. The latter contribute significantly to liquidity. It is illustrative, therefore, to look at figures for the New York cotton futures contract. In late April 1992, cotton futures contracts extended to March 1993. The total open interest outstanding on one day was about 34,000 contracts, equivalent to 770,000 tons of cotton. The daily volume of transactions was roughly 7,000 contracts or 159,000 tons. Annual US production of cotton is about 3.5 million tons. Roughly then, the open interest amounted to 22% of annual production and the daily trading volume to 4.5% of annual production. In Egypt's case, if only the cotton that is exported is traded on the futures

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[13]The clearing house has as its main function, the maintenance of guaranty deposits, the maintenance of the original and variation margins, the recording and posting of transactions and also handling of physical deliveries.

exchange, roughly 50-55,000 tons annually, it is very doubtful that there would be sufficient liquidity. If the numbers for the United States applied to Egypt, only 1.5 to 2.5 thousand tons would be traded. If, however, all cotton produced is included, then daily trades would increase to 14-15 thousand tons. Again it is doubtful whether this volume is large enough to support a futures market.

The issue of liquidity should also be examined in conjunction with the varieties and grades of Egyptian cotton. Egyptian cotton is very well classified. The exported ELS cotton consists of four varieties, each of which has five grades (Giza 45 has seven grades). The exported LS consist of two varieties with five grades each. In terms of magnitudes, ELS production was about 83,000 tons and exports 27,000 tons in 1990. The figures for LS are 209,000 tons produced and 7,000 tons exported during 1990. Usually, the futures contract is based on a specific grade within a variety with discounts and premiums applied to the qualities delivered above and below the average. If two contracts were to be introduced, one based on the average variety and grade for ELS and the other on the LS, liquidity could be an even greater problem. However, given the results in Table 7, ELS and LS prices move closely together with a basis risk of about 17%, which is within an acceptable range. So for the sake of liquidity, one contract based on the most prominently traded variety and grade of the ELS could represent both the ELS and LS varieties and deliverable grades, with, of course, the appropriate discounts and premium.[14] Still, liquidity could be a significant constraint--particularly if only exports are included. However, it would also be an important constraint even if the whole cotton production (ELS and LS) was represented by this contract.

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[14]Basis risk signifies the difference in the movements between two prices. According to commodity brokers in New York, an acceptable basis risk is below 20%.

Since the futures market is considerably more complicated for traders than the present system and it is questionable whether there would be sufficient volume necessary for the effective operation of a futures market in Egypt, the Cotton Exchange should start with only a spot market. There are two types of spot markets that could be considered for Egypt's cotton; a physical auction market and an electronic tender market. A physical auction market is one where commodities are brought to the market and auctioned off. Examples of this are the tea auction markets in Calcutta, Chittagong, and Mombasa and the coffee auction market in Nairobi. At present, there are no physical auction markets for cotton.

One of the main reasons for the non-existence of physical auction markets for cotton is that the same commodity trading can be accomplished much more efficiently by a tender system using telex, fax or other electronic means of communication. An important advantage of the tender system is that neither the commodity (samples, in the case of cotton) nor the people involved in the trade have to be physically at the same place where the sale occurs. Egypt and many other countries utilize tenders to purchase cotton for import. Tanzania's cotton is tendered using modern communication facilities. Tanzania's Cotton Board sends messages to potential buyers providing detailed information about the cotton to be sold. Bid openings and sales awards are public events. Unannounced reserve prices are utilized to prevent sales at prices regarded as unacceptably low. More efficient versions of the auction process have been used since 1975 for marketing cotton produced in the US Southwest region (Texas plains and Oklahoma) through an electronic communication network managed by Telcot. Continued innovations in communications have enabled improvements in local coverage and the range of services provided.

It would be feasible for Egyptian cotton to be traded by tender within an anticipated private marketing system. Cotton's durability, storability and established system for quality determination make it possible to trade cotton without the physical presence of buyers at the trading site. However, the

confirmation of the quality of the delivered product must be reinforced by trading rules that permit arbitration of quality disputes by agreed experts.

For a cotton tender trading system to operate efficiently and internationally in Egypt, GOE and the cotton industry would have to make several changes, including:

(a) Introduce market incentives for the operation of parastatals and permit the involvement of private sector companies in both exporting and domestic trading. The privatization of the six exporting parastatals while desirable is not essential for the tender trading system to operate. More important is the introduction of market incentives into the cotton trading system.

(b) Sell through the system for domestic demand as well as for export. The benefit would be the increased volume, the transparency of price discovery, and the integration of domestic and export prices.

(c) If imposed, make export taxes explicit, instead of setting fixed prices with the tax (or subsidy) being the residual. This, again, is necessary to render the system transparent for everyone involved.

Such a trading system could be operated by an independent, private body or by a cotton exporters' association once the cotton trade has been liberalized.

After a physical spot market for cotton has been established and has earned the trust of the business community, a next step could be the establishment of a forward market.[15] A forward market functions like a spot market, i.e., using the proposed auction form, with the only difference being that the physical delivery of cotton will be sometime in the future. The establishment of a forward market could provide a useful instrument for hedging Egyptian cottons.

[15]A forward market can function as a futures market in terms of hedging. Producers, by selling forward can "lock" a price, the same way as if they sold futures. The two notable differences between futures and forward markets are: first, forward markets usually require physical delivery. Second, forward markets do not require daily margins (marked-to-market), thus the performance risk can be significant.

VI. Conclusions

This paper has shown that short-term movements in Egyptian cotton prices, extra-long staple and long staple, are not correlated with movements of cotton prices in the New York futures market. Therefore, Egyptian cottons cannot be hedged using the New York cotton futures contract. Similar tests on American Pima prices (an extra-long staple cotton that substitutes for some Egyptian cottons) and US medium staple cotton prices showed no relationship between their price movements. It was also found that no relationship exists between movements in Egyptian cotton prices and prices of cottons from Turkey, Pakistan, Central Asia, Mexico, and Australia. This led us to formulate two explanations. First, Egyptian cottons possess sufficiently different characteristics from medium-staple cottons such as the ones tested that their price movements are not correlated. Second, the prices of Egyptian cottons have been so heavily influenced by governmental intervention that their movements were divorced from market fundamentals. The government's recent reform program may increase the correlation between Egyptian and other cotton prices to some extent. This may be more the case for the LS Egyptian cotton than the ELS cotton, given that the LS cotton has more substitutes in the international market.

When examining the correlations between cotton price movements, we found that price movements between medium-staple cottons from various origins were correlated among themselves but not with price movements in the New York No. 2 cotton futures contract. In effect, therefore, none of the other medium-staple cottons tested can be hedged using the New York cotton futures contract. However, the medium-staple cotton prices were correlated with the Cotton Outlook "A" index. So, the recent introduction of a New York futures contract based on the Cotton Outlook "A" index may provide medium-staple cottons with a useful hedging instrument--but not the Egyptian cottons. Egyptian cotton price movements were not correlated with movements in the Cotton Outlook "A" Index.

In examining whether a futures exchange can be established in Egypt for Egyptian cottons, the study found the following obstacles: (a) lack of a well-established physical market; (b) the existence of heavy government intervention in domestic commercialization and exports; and (c) in all likelihood, lack of adequate liquidity for establishment of a futures contract. For these reasons it may not be wise to try to establish a futures contract for Egyptian cotton. Rather, it is recommended that Egypt should try to establish a spot market in order to bring transparency to price-setting. A necessary condition for such a market to function soundly is for the private sector to play a significant role. If a spot market is established, after some time the next step can be to set up a forward market that could provide a hedging instrument for Egyptian cottons.

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