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Competitiveness analysis of Egyptian cotton exports with special focus on the Chinese market

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Abstract

Purpose – The expected growth of China's cotton imports along with Egypt's quest for penetrating new cotton importing markets have together attracted the authors to investigate the competitiveness and the demand for Egyptian cotton in the Chinese market in order to capture the emerging opportunities that Egypt could gain from such a growing market. The paper aims to discuss these issues

Design/methodology/approach – The paper employs Balassa's index of revealed comparative advantage and Vollrath's indices of revealed competitive advantage in order to measure the competitiveness of Egyptian cotton exports. An Almost Ideal Demand System(AIDS) approach was then used to estimate demand parameters for Chinese cotton imports from Egypt and major supply sources during the period 1992-2011.

Findings – Results show that Egypt has experienced dramatic declines in its cotton comparative advantage over the analyzed period. The estimation results of the AIDS model indicate that Egypt's market share is positively affected by both own and US export prices, but negatively influenced by export prices of other competitors in the Chinese market. Results also indicate that Egyptian cotton is substitutable for cotton imports from all other regions, especially for US cotton. Moreover, additional Chinese expenditure on cotton imports would favor other suppliers. Finally, demand for Egyptian cotton was found to be more sensitive to price changes and there is a greater tendency for China to switch to Egyptian cotton than the other way around should relative prices change.

Originality/value – This paper is original and novel in that; despite numerous studies have been done on China's demand for cotton and the several studies have been carried out on export and marketing of Egypt's cotton, the issue of cotton trade between Egypt and China has rarely been empirically examined. Furthermore, our results update important parameter estimates, particularly import demand elasticities of cotton. For Egypt, the study provides useful policy implications that could help policy makers to improve informed decision making with regard topromoting cotton exports to the Chinese market. For China, the study helps understanding the interrelationship between the Chinese cotton market and other emerging exporting markets, while focusing on the Egyptian market.

Keywords Competitiveness analysis, China's cotton imports, Egyptian cotton, Revealed comparative advantage, Almost ideal demand system

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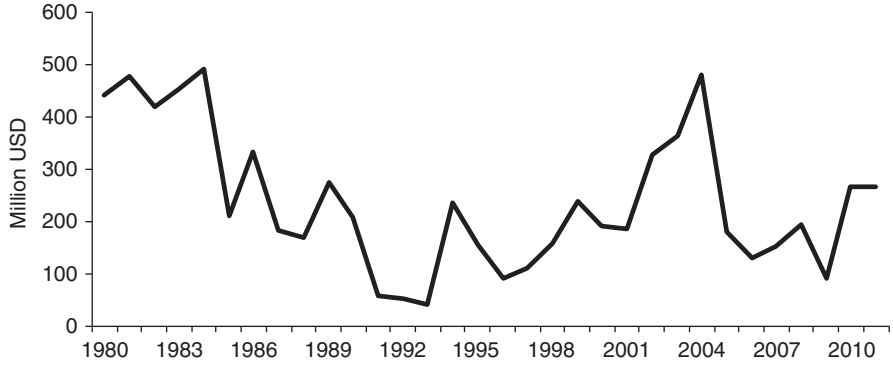
1. Introduction

Cotton has always been playing a dominant role in the economy of Egypt in terms of its contribution to the GDP and merchandise exports as well as poverty reduction. Egypt has also been known as an exporter of high-quality cotton and used to supply about 80 percent of the world market during the 1960-1970s (Goueli and El-Miniawy, 1995). Available statistics show that cotton makes up 20 percent of Egypt's agricultural exports and provides livelihood to more than half a million Egyptian rural households and indirectly generates over one million additional jobs (The Central Agency for Public Mobilization and Statistics, 2010).

Nevertheless, Egyptian cotton exports have experienced sharp fluctuations and declines over the last two decades. Figure 1 shows that cotton exports dropped from about 494 million USD in 1984 to only 53 million USD in 1992. This decline can be mainly attributed to the negative consequences of the 1994 cotton sector liberalization law. According to this law, Egyptian farmers become free to decide the crops they wanted to plant, and private traders were allowed to buy the crop, gin it and either sell it to local spinners or export it. The immediate impact of this liberalization policy was instability in cotton acreage, total production, manufacturing and exports as well.

Between 2000 and 2004, cotton exports took an upward trend, increasing from USD 193.2 million to about 482.0 million USD (Figure 1). Partially, this can be explained by the devaluation of the Egyptian Pound in 2000 which was followed by the official flotation of the Pound in 2003. This resulted in the currency loosing half of its value, which in turn created an increased demand for Egyptian cotton by international buyers. As from 2005, the year where the multi-fiber agreement was expired, Egyptian cotton export began to decline again. This was mainly due to inappropriate policy response to changes in the global cotton market, lack of a proper information mechanism for farmers, and also low prices caused by over supply which encouraged farmers to plant other crops in the following seasons.

In response to these domestic problems and declines in cotton exports, the government of Egypt has taken several measures in order to promote cotton exports and reinstall the fame and competitiveness of cotton. These measures were well-articulated in the Egyptian Agricultural Export Development Strategy and the Egyptian Agricultural Development Strategy. These two strategies place special emphasize on the need for Egypt to improve the access of cotton exports to traditional import markets and also gaining further market shares in new markets through trade



Source: UN –COMTRADE Database, World Bank, World Integrated Trade Solution (2012)

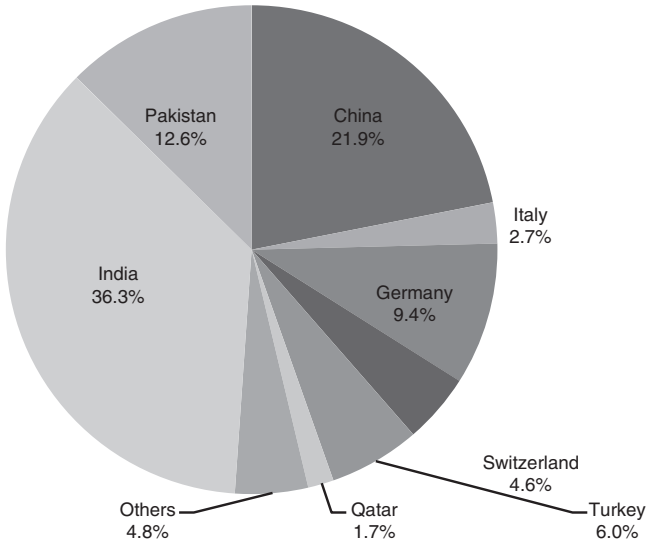
Figure 1.
Development in Egyptian cotton exports, 1980-2011

agreements and export promotion activities (Industrial Modernization Center, 2007; Abul-Naga, 2009).

Within Egypt's quest to penetrate new markets for its cotton exports, China represents an important market that Egypt could target. It might be questionable to center our study on the Chinese market, given the fact that Egypt's share in the Chinese market for imported cotton is about only 1 percent. However, for several good reasons, Chinese market attracted the authors to analyze the demand for Egyptian cotton. First, from an Egyptian perspective, China is gradually becoming a major destination for Egypt's cotton, while it absorbs roughly 22 percent of Egyptian cotton exports (Figure 2). Second, Egypt's imbalanced trade pattern with China has resulted in a growing trade surplus of about 4.0 billion USD in favor of China and raised great concerns among Egyptian policy makers. In this respect, Abu Hatab (2011) examined areas where bilateral trade between the two countries could arise and indicated that cotton seems to be the main significant area where Egypt could improve its agricultural exports to China. Third, MacDonald *et al.* (2010) reveal that the world cotton prices have been highly correlated with China's net cotton imports for decade and therefore the volatility of China's cotton imports augments its importance and impacts on determining world cotton prices. Moreover, Fuller *et al.* (2003) shows that China's import demand for cotton is expected to increase in the medium-term in response to increased exports of textiles and clothing.

Against this background, this paper specifically aims to examine the competitiveness of Egypt's cotton exports and to investigate the Chinese demand for Egyptian cotton in order to better understand the driving forces of Chinese cotton market and to capture the emerging opportunities that Egypt can gain from such a growing market.

The paper is structured as follows: Section 2 measures the competitiveness of Egyptian cotton exports by using Balassa's index of revealed comparative advantage



Source: UN – COMTRADE Database, World Bank, World Integrated Trade Solution (2012)

Figure 2.
Major importers of Egyptian cotton, average 2000-2012

(RCA) and Vollrath's indices of revealed competitive advantage. Section 3 analyzes china's demand for Egyptian cotton and consists of the following sub-sections; a brief overview of the Egypt's exports of cotton to China, followed by a presentation of the econometric strategy, a description of the data and data sources and then estimated results are presented and discussed. Finally, Section 4 summarizes the paper and draws concluding remarks.

2. Measuring competitiveness of Egyptian cotton exports

The concept of comparative advantage has been widely used in economic literature to assess the specialization of countries in commodities which they have a competitive edge. However, due to the lack of comprehensive data on factor costs, Greenaway and Milner (1993) illustrate that the concept in its true sense is difficult to measure. Therefore, several attempts have been made to indirectly measure comparative advantage of countries. In this paper, we employ two of the most widely accepted indirect indices to measure export competitiveness, namely; Balassa's RCA index and Vollrath's measures of revealed competitiveness, in order to assess the competitiveness of Egyptian cotton.

Balassa's index of RCA

In 1965, Balassa derived an index that measures a country's RCA in the trade of a particular product by the share of that product in the country's total exports relative to the product's share in the total world export. Thus, the RCA index identifies whether a country has a RCA rather than to specify the underlying sources of the comparative advantage. The RCA index can be defined as follows:

$$RCA_{ad} = (X_{ad}/X_a)/(X_{wd}/X_w) \tag{1}$$

where RCA_{ad} is the revealed comparative advantage index for d of country a; X_{ad} the exports of commodity d of country a; X_a the total exports of country a; X_{wd} the total world exports of commodity d; and X_w the total world exports.

A value less than one of the RCA index occurs when the commodity's share in a country's exports is less than its share in world trade. This indicates that the country has a revealed comparative disadvantage in the trade of that commodity. In contrast, if the ratio is greater than one, the country has a revealed comparative advantage.

Figure 3 summarizes the calculations of the Balassa's RCA index for Egypt and the main cotton exporters in the world. It show that values of RCA index are greater than one and ranged from 5.4 to 79.1 in 2009 and 2002, respectively. This implies that Egypt has high cotton export shares that exceed their shares in the total world exports. However, Figure 3 reveals that Egypt's RCA in cotton has been declining over the period understudy, while it shrank from about 39.5 in 2000 to 5.47 in 2012.

Vollrath's indexes of revealed competitive advantage

One of the shortcomings of Balassa's RCA index is that it cannot provide either an ordinal or a cardinal measure of a country's revealed comparative advantage (Yeats, 1985). Vollrath (1991) investigated alternative indexes and tested trends of international competitiveness in agriculture under the RCA model. He proposed that RCA can be estimated under international competitiveness in four principal areas under RCA theory, which include; the relative trade advantage (RTA_{ad}), revealed competitiveness index

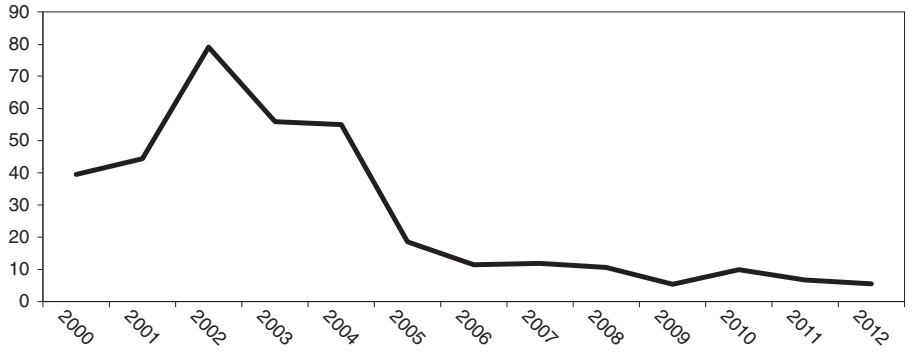


Figure 3.
Balassa's revealed comparative advantage indexes for Egypt in Cotton, 2000-2012

Source: Authors calculations based on data from UN Comtrade

(RC_{ad}), the relative export advantage (RXA_{ad}), and relative import advantage (RMA_{ad}). According to Vollrath (1991), positive values of RXA_{ad}, RTA_{ad}, and RC_{ad} indicate revealed competitive advantage while negative values indicate revealed competitive disadvantage. Vollrath's indeces as presented in Havrila and Gunawardana (2003) as follow:

$$RTA_{ad} = RXA_{ad} - RMA_{ad} \tag{2}$$

$$RC_{ad} = Ln(RXA_{ad}) - Ln(RMA_{ad}) \tag{3}$$

$$RXA_{ad} = (X_{ad}/X_{na})/(X_{dr}/X_{nr}) \tag{4}$$

$$RMA_{ad} = (M_{ad}/M_{na})/(M_{ad}/M_{nr}) \tag{5}$$

where RTA_{ad} is the relative trade advantage of country a in commodity d; RC_{ad} the revealed competitiveness index of country a in commodity d; RXA_{ad} the relative export advantage of country a commodity d; RMA_{ad} the relative import advantage of country a in commodity d; X_{ad} the exports of commodity d, by country a; X_{na} the exports of all commodities, excluding commodity d, by country a; X_{dr} the exports of commodity d, by the rest of the world, excluding country a; X_{nr} the exports of all commodities excluding commodity d, by all countries in the world excluding country a; M_{ad} the imports of commodity d, by country a; M_{na} the imports of all commodities, excluding commodity d, by country a; M_{dr} the imports of commodity d, by the rest of the world; M_{nr} the imports of all commodities, excluding commodity d, by all countries in the world, excluding country a; X the exports; M the imports; n the rest of the commodities; r the rest of the world; and Ln the natural logarithm.

Table I presents Vollrath's revealed competitive advantage indices in cotton for Egypt during the period 2000-2012. Results show that Egypt's RXA, RTA, and RC indices are positive, reflecting revealed competitive advantage in cotton. However, the table indicates that the values of these indices have been declining over time. This means that Egypt is becoming less competitive in the export of cotton.

In sum, the calculations of the Balassa's RCA index and the Vollrath's indices of revealed competitive advantage show that Egypt has experienced some structural

Year	RTA	RXA	RC
2000	40.971	42.420	1.466
2001	46.451	47.889	1.523
2002	89.855	90.347	2.264
2003	60.955	62.287	1.670
2004	56.231	61.543	1.064
2005	16.570	19.210	0.862
2006	8.267	11.706	0.532
2007	9.141	12.134	0.608
2008	6.962	10.852	0.446
2009	1.042	5.427	0.093
2010	7.076	10.128	0.521
2011	5.000	6.794	0.578

Source: Authors calculations based on data from UN Comtrade

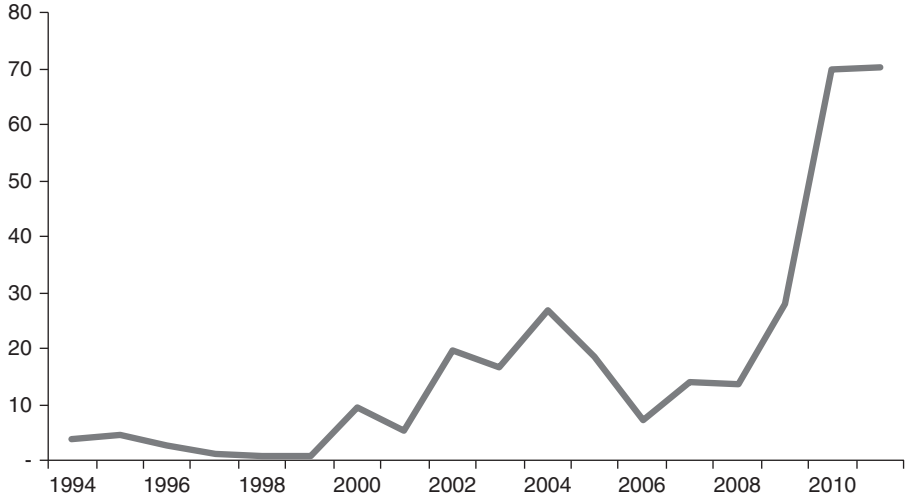
Table I.
Vollrath indices for Egypt and other major exporting countries in cotton, 2000-2011

changes in cotton exports over the past decade. The most dramatic decline in Egypt's comparative advantage has been seen during the last few years. Thus, it can be argued that Egypt may attempt to exploit forms of competition other than comparative advantage, such as product differentiation and improved quality. As a high quality cotton producer, and by implementing an effective promotion strategy, Egypt may potentially improve its competitiveness.

3. An analysis of Chinese demand for Egyptian cotton

Overview of Egyptian cotton exports to China

A look at Figure 4 shows that Egyptian exports of cotton to China have grown from 3.7 million USD in 1994 to about 9.5 million USD in 2000, registering an increase rate of 156.0 percent. Cotton exports then climbed to 28.0 million USD in 2009 before posting their best year ever with about 70.0 million USD in 2011. Despite the recent



Source: UN – COMTRADE Database, World Bank, World Integrated Trade Solution (2012)

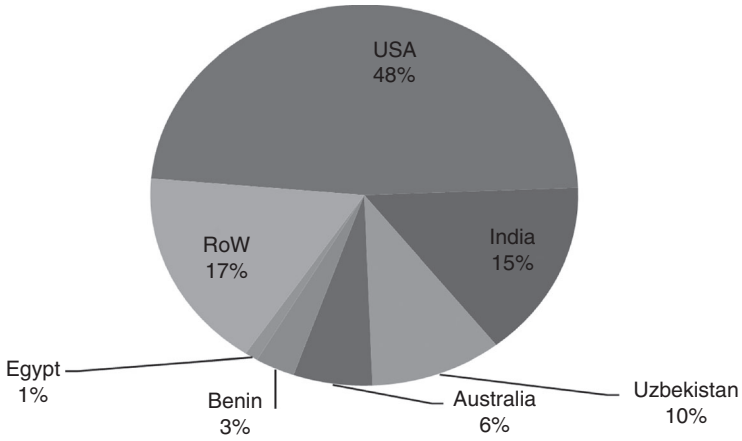
Figure 4.
Trends in Egyptian cotton exports into China (1992-2011)

growth in Egyptian exports of cotton to China, Figure 5 indicates that the overall performance of Egyptian cotton in the Chinese market is unsatisfactory, reflected in a modest market share of about 1.0 percent during the period 1992-2012. The same figure shows that China's market for imported cotton is mainly dominated by US exports, which calculate for almost half of Chinese total cotton imports. Other major cotton suppliers to China are India, Uzbekistan, Australia, and Benin, which collectively account for 34 percent of China's cotton imports.

Empirical model and estimation method

During the last two decades, consumer demand analysis has moved toward system-wide approaches (Taljaard *et al.*, 2004). The Linear Expenditure System (LES), the Constant Difference of Elasticities (CDE) demand system, the Homothetic Cobb-Douglas (HCD) system, the Almost Ideal Demand System (AIDS), the Translog system, and the Rotterdam model are examples of popular demand systems in recent applied work (Yu *et al.*, 2004). In comparatively short time, the AIDS, since it was introduced by Deaton and Muellbauer (1980), has been widely adopted by agricultural economists to the point that it now appears to be the most popular of all demand systems (Eakins and Gallagher, 2003; Taljaard *et al.*, 2004). Eales and Unnevehr (1994) illustrate that AIDS has been applied popularly for various reasons; first, it gives an arbitrary first-order approximation to any demand system and a second-order local approximation to any cost function (Hong and Duc, 2009). Barnett and Kanyama (2013) indicate that the functional forms of AIDS are locally flexible, in the sense that they do not put a priori restrictions on the possible elasticities at a point.

Second, AIDS demand function satisfies the principles in demand theory and its estimation is less complicated than other models and it satisfies the axioms of choice exactly (Pangaribowo and Tsegai, 2011). Third, the model has the advantage over other locally flexible functional forms as it is compatible with aggregation over consumers and it can be interpreted in terms of economic models of consumer behavior when estimated with macroeconomic or household survey data (Seale *et al.*, 1992).



Source: UN – COMTRADE Database, World Bank, World Integrated Trade Solution (2012)

Figure 5.
Major suppliers of cotton to Chinese market

Fourth, the system satisfies restrictions imposed by the consumer allocation problem as it permits testing of general restrictions, and since homogeneity and symmetry restrictions depend only on the estimated parameters, they are therefore easily tested and/or imposed (Tafere *et al.*, 2011). Fifth, it aggregates perfectly across consumers without invoking parallel linear Engel curves and it also has a functional form which is consistent with known household-budget data (Nygård, 2013).

In recent years, many authors applied the AIDS model to foreign demand analysis; for instance, Hui and Turay (1995), Satyanarayana *et al.* (1999), Schmitz and Seale (2002), Lopez and Malaga (2004), Nahuelhual (2005), and Isin and Miran (2009). The AIDS model has been often used in the existing literature to estimate China's agricultural commodity demand functions (e.g. Cai *et al.*, 1998; Liu and Chern, 2001; Wu *et al.*, 1995; Zhuang and Abbottb, 2007; Zheng and Henneberry, 2010).

Based on the stated advantages, we deem AIDS as an appropriate tool for the empirical analysis of China's cotton import demand, estimation of demand parameters and testing of the theoretical restrictions. The AIDS model can be defined as follows:

$$w_i = \alpha_i + \Sigma_j \gamma_{ij} \ln P_j + \beta_i \ln\left(\frac{X}{P}\right) \tag{6}$$

where w_i is the expenditure share of exporter i in total cotton import by China. P_j is the cost, insurance and freight (CIF) price per ton of the cotton paid by China for cotton originating from source j. X is China's total cotton import value, α, β and γ the estimated parameters, e error term and P^* is the Stone's Price Index (the sum of lagged share-weighted log prices). Lagged budget shares are used as weights in constructing Stone's Price Index to avoid simultaneity (Eales and Unnevehr, 1994). It can be explained as follows:

$$\ln(P^*) = \alpha_0 + \Sigma_i \alpha_i \ln P_i + \frac{1}{2} \Sigma_i \Sigma_j \gamma_{ij} \ln P_i \ln P_j \tag{7}$$

The following restrictions ensure that the AIDS model's theoretical consistency is the demand's adding up, homogeneity and symmetry:

$$\text{Adding-up: } \sum_{i=1}^{n} \alpha_i = 1, \sum_{i=1}^{n} \gamma_{ij} = 0, \sum_{i=1}^{n} \beta_i = 0; \tag{7a}$$

$$\text{Symmetry: } \gamma_{ij} = \gamma_{ji}, \text{ for all } I \neq j; \text{ and} \tag{7b}$$

$$\text{Homogeneity: } \sum_{j}^{n} \gamma_{ij} = 0, \text{ for } i = 1, 2 \ldots n \tag{7c}$$

In line with LaFrance (1991) and Edgerton (1993), the price index is approximated by Stone's price index, and expenditures are linear in their parameters. The latter is sufficient for endogenity of expenditures. Therefore, the iterative Zellner's seemingly unrelated regression (SUR) is an appropriate technique for the estimation of parameters of the LA/AIDS demand system.

Empirically, homogeneity and symmetry conditions can be tested. However, since the data adds up by construction, the adding-up condition is not testable. Therefore, homogeneity and symmetry restrictions were imposed in the estimation process. Because LA/AIDS equations are estimated as a system, restrictions were tested

individually. We follow Theil (1971) and Woodland (1986), who revealed that using F-statistic in finite samples, instead of Chi-squared statistics, results in the rejection of the null hypothesis in smaller number of cases. The test can be defined as follows:

$$\hat{g} = (R\beta - r)'(R[X'(\Sigma^{\wedge -1} \otimes I)^{-1}R')^{-1}(R\beta - r) \sim F_{(J,TM-K)} \tag{8}$$

where $\hat{g}$ is the test statistic, R is a matrix of the of restrictions of dimensions J (number of linear restrictions) by K (number of parameters in the system), β is the unrestricted SUR estimate, r is a vector of restriction constants, X is the design matrix, $\hat{\Sigma}$ is the cross-equation covariance matrix, $\otimes$ is a symbol for Kronecker product, and I is an identity matrix of dimension equaling the number of observations.

Elasticities are calculated using the Green and Alston (1991) framework, which implies that the elasticity formula takes a different form when Stone's Price index is defined with lagged budget shares rather than the one considered theoretically correct. The expenditure elasticity, uncompensated (Marshallian) price elasticities, including cross-price elasticities and own-price elasticities, were calculated as follows:

$$\text{The expenditure elasticities: } \eta_i = 1 + (\beta_i / w_i) \tag{8a}$$

$$\text{Uncompensated price elasticities: } \varepsilon_{ij} = -\delta_{ij} + \frac{\gamma_{ij}}{w_i} - \beta_i \left(\frac{w_j}{w_i}\right) \tag{8b}$$

$$\delta_{ij} \text{ is the Kronecker delta } (\delta_{ij} = 1, \text{ if } i = j;\ \delta_{ij} = 0, \text{ if } i\ j) \tag{8c}$$

Last, autocorrelation was tested in the model by employing the procedure suggested by McGuirk *et al.* (1995).

Data and data sources

In estimating the AIDS model, a dataset on quantities and values of China's cotton imports from its major suppliers (USA, India, Uzbekistan, Australia, Benin) and Egypt was used. China's cotton imports from these countries amount to roughly 83 percent of its total cotton imports during the period 1992-2011. The empirical analysis is based on the UN-Comtrade Database (World Integrated Trade Solution (WITS)), the Central Agency of Public Mobility and Statistics in Egypt, and the National Bureau of Statistics of China.

Due to the unavailability of import prices for all the exporting countries, unit values were used as a proxy. The unit value, which is equivalent to average CIF prices, were calculated by derivation from import values and import volumes for each individual supply source. Expenditure is equal to the product of quantity imported by China from each supplier and its corresponding price, which is also equal to import values.

Table II shows that for the period 1992-2011, US ranks first as a cotton supplier to the Chinese market (47.5 percent), followed by Australia (9.3 percent), Uzbekistan (7.1 percent); whereas Egypt comes in last place with a market share of 1.3 percent. Egypt, the producer of one of the world's highest quality long-fibered cotton, registered the highest average unit import values of roughly 2.6 thousand USD per ton, followed by Australia, Benin, USA, India, and Uzbekistan follow with values of about 1.6 and 1.5, 1.3, 1.1, and 1.0 thousand dollars, respectively. Such variation in import unit values

	Mean	SD	COV[b]	Minimum	Maximum
Budget shares					
W_{USA}	47.55	13.83	0.29	7.93	64.86
W_{IND}	4.98	8.66	1.74	0.03	27.20
W_{UZB}	7.13	3.97	0.56	0.12	13.20
W_{AUS}	9.28	6.44	0.69	1.41	24.51
W_{BEN}	2.55	2.80	1.10	0.04	9.11
W_{EGY}	1.32	1.85	1.40	0.09	5.82
W_{ROW}	27.20	14.81	0.54	11.27	77.09
Prices					
P_{USA}	1,327.59	427.20	0.32	525.45	1,898.6
P_{IND}	1,079.74	473.90	0.43	176.26	1,628.09
P_{UZB}	1,025.09	468.50	0.46	255.07	1,745.23
P_{AUS}	1,565.97	260.96	0.17	1,181.75	2,126.32
P_{BEN}	1,542.21	278.42	0.18	991.03	2,065.74
P_{EGY}	2,591.84	467.12	0.18	1,988.87	3,739.18
P_{ROW}	1,183.88	404.32	0.34	546.81	1,698.61

Notes: [a]Budget shares are measured in percentages and prices are measured in US dollars/ton. [b]COV = coefficient of variation = mean/standard deviation

Table II. Summary statistics of cotton prices and budget shares in the Chinese market[a], 1992-2011

may be primarily attributed to the differences in cotton quality and the effect of general economic trends and international price changes as well.

The coefficient of variation for Egypt's market share (1.4) points out to the instability in Egyptian cotton exports to China. In contrast, USA has the most stable market share which averaged 47.5 percent and ranged from about 8.0 to 65.0 percent. The prices in the same table vary relatively less variable than market shares which implies that market shares might be affected by factors other than prices, including; Chinese economic conditions, supply diversification policies and trade policies.

Parameter estimates of China's cotton import demand equations

Based on our model estimation results, the tail probabilities were found to be greater than conventional levels of significance which suggest that the error structures of the respective unrestricted model do not differ from that of the restricted one. Accordingly, we fail to reject the null hypothesis and this in turn implies a better match between the sample information and imposed restrictions. Therefore, our analysis will rely on the results of the restricted model with homogeneity or symmetry imposition[1]. Table III presents the estimated parameters and *t*-values of the AIDS model, which reveal the shares of countries from which China imports cotton, China's expenditures and the extent of the impact of export price on exporting countries. In this table, α_i is the intercept of i expenditure share equation, γ_{ic} indicates the parameter on price of source i, and β_i indicates the parameter on expenditure in equation of i. So, γ_{ic} refers to the change in the market share of i for a unit proportionate change in export price, while β_i indicates the change in a share of i for a unit proportionate in China's expenditure on imported cotton. Given that our aim is to examine the competitive position of Egyptian cotton in the Chinese market, we primarily focus on results related to the Egypt-China link, while results related to other suppliers are discussed where necessary.

A look at the price parameters in Egypt's equation reveals that these parameters are statistically more reliable than those in the remaining equations. Egyptian cotton

Exporter	α_I	γ_{EGY}	γ_{USA}	γ_{IND}	γ_{UZB}	γ_{AUS}	γ_{BEN}	γ_{ROW}	β_i
Egypt	0.708	0.026[a]	1.006[a]	−0.412[b]	−0.082	−0.363	−0.097[b]	−0.077[a]	−0.132
	(0.99)	(2.1)	(2.33)	(−2.65)	(−0.29)	(−0.27)	(−3.02)	(−2.05)	(−0.93)
USA	−0.52[b]		−3.372[b]	1.404	−3.953	5.482	−2.951	2.382	0.186[b]
	(−2.61)		(−3.18)	(0.36)	(−0.68)	(0.07)	(−0.51)	(1.47)	(4.8)
India	−0.020			2.612[b]	−0.082[a]	0.091	1.337	−4.938	0.006
	(−0.47)			(8.27)	(−2.09)	(0.14)	(0.77)	(−0.54)	(0.72)
Uzbekistan	−0.120*				4.589[b]	−0.012	−1.055	0.592[a]	0.036[b]
	(−2.15)				(4.42)	(−0.91)	(−0.77)	(−1.95)	(3.30)
Australia	0.241*					3.314[a]	−1.264	−7.246	−0.022
	(2.16)					(1.72)	(−0.98)	(−0.43)	(−1.02)
Benin	0.037						1.083[b]	4.066	−0.000
	(0.57)						(3.55)	(0.32)	(−0.05)

Table III.
Parameter estimates of China's cotton import demand equations

Notes: Figures within parentheses are the *t*-ratios. [a]$\alpha = 0.05$ significant level; [b]$\alpha = 0.01$ significant level, system $R^2 = 0.8991$ and $\hat{g} = 0.29355$

exports to China are influenced positively with its own export prices and US prices. This means that Egypt's market shares would increase by 0.03 percent and 1.0 percent with each 1 percent increase in Egyptian and US export prices, respectively. However, export prices of India, Australia, Benin, Uzbekistan and RoW have negative impact on Egyptian share in the Chinese market. Therefore, one percent increase in the export prices of these suppliers reduces the Egyptian market share by 0.41, 0.36, 0.09, 0.08, and 0.07 percent, respectively.

Except for Egypt and Australia, the parameters on expenditures are all positive. This suggests that the Chinese expenditures on cotton imports have a negative influence of Egypt's market share. So, an increase of 10 percent in China's expenditure would lead to a decline of 1.3 percent in Egyptian cotton exports to China. Nevertheless, these estimates, with exception to those in the USA and Uzbekistan equations, are not statistically significant. Moreover, the majority of parameters have low *t*-values indicating a wider distribution around their means. In general, expenditure parameters imply that China has a preference for cotton imports from the USA and Uzbekistan over the other regions.

Discussion on import demand elasticities

Chang and Nguyen (2002) reported that while price and income derivatives are nonlinear functions of parameters and variables, individual coefficients may not have the usual interpretation or expected signs. Further, Deaton and Muellbauer (1980) illustrated that β is positive for luxuries and negative for necessaries and some commodities may be inferior when interpreted in elasticity terms. This turns out to be the case for the Chinese cotton imports in this paper. Therefore, it is much more meaningful to focus our discussion on the elasticities.

Elasticities driven from the parameters of China's cotton import system are summarized in Table IV. It is obvious that most of the estimated price elasticities are statistically insignificant. Reversely, the expenditure elasticity estimates, except for Egypt, are statistically significant. This coincides with Deaton and Muellbauer (1980) who showed that demand responses to total expenditure are relatively easy to measure with precision, while price responses are more difficult to obtain.

Exporter	ε_{EGY}	ε_{USA}	ε_{IND}	ε_{UZB}	ε_{AUS}	ε_{BEN}	ε_{ROW}	Expenditure elasticities (η_i)
Egypt	*−0.985**	−0.010	−0.042	−0.014	0.803	0.801	0.684	−1.239
	(1.99)	(0.002)	(0.22)	(0.01)	(0.01)	(0.01)	(0.02)	(1.04)
USA	2.051****	*−1.186**	−1.452	−1.335****	0.215****	0.116	0.416****	1.175****
	(0.59)	*(2.10)*	(0.47)	(1.03)	(0.06)	(0.06)	(0.04)	(0.12)
India	0.147	−0.224	*−1.131**	−0.827	0.022	0.002	0.504	1.507****
	(0.05)	(0.01)	*(0.01)*	(0.01)	(0.01)	(0.01)	(0.03)	(1.16)
Uzbekistan	0.244	−0.029	−0.109	*−1.837**	0.025	0.107	0.066	1.533****
	(0.08)	(0.01)	(0.04)	*(0.03)*	(0.01)	(0.02)	(0.01)	(0.09)
Australia	0.315	−0.052	−0.176****	−0.114	*−0.677**	0.014	0.096	0.590****
	(0.12)	(0.01)	(0.06)	(0.04)	*(1.30)*	(0.07)	(0.01)	(0.09)
Benin	0.229	−0.012	−0.024	−0.024	0.008	*−0.999**	0.025	0.797****
	(0.01)	(0.01)	(0.01)	(0.11)	(0.03)	*(0.01)*	(0.01)	(0.10)
RoW	1.606	−0.197	−0.765	−0.894	0.113	0.068	*−0.082**	0.149****
	(0.31)	(0.10)	(0.34)	(0.67)	(0.03)	(0.03)	*(1.36)*	(0.08)

Notes: Figures within parentheses are the standard errors computed from the estimated import demand system parameters. *,**Significant at 0.05 and 0.01 percent levels, respectively

Table IV.
Estimates of conditional Marshallian and expenditure elasticities for China's cotton import demand

All own uncompensated price elasticities are negative, ranging from, in absolute values, 0.08 in the case of RoW to about 1.83 in the case of India. In absolute values, the response of shares to changes in Egypt's and Benin's own market prices is close to proportionate. However, USA, India, and Uzbekistan price elasticities are greater than one, indicating an elastic price response, while the response of both RoW and Australia is the inelastic. The standard error value in Table IV indicate that countries' own price elasticities are all smaller than their corresponding elasticity estimates, which implies a fair degree of stability in these elasticities. In this respect, USA, Australia, and the RoW are exceptions.

In relation to expenditure elasticities, Table IV show that, with the exception of Egypt, all expenditure elasticities are positive, ranging from 0.15 for RoW and 1.17 for the USA. On the one hand, the negative Egyptian expenditure elasticity implies that Chinese cotton imports from Egypt are expenditure inelastic. On the other, expenditure elasticities for India, Uzbekistan, and USA are greater than the unity. This implies that additional Chinese expenditure on imported cotton would favor these suppliers at the cost of imports originating from Australia, Benin, RoW, or Egypt. Specially, USA cotton was perceived to be of better quality than that of Egypt, as expenditure elasticities are generally thought to be higher for the best or preferred grade and smaller for lower grades (Tomek and Robinson, 2003). Therefore, the stronger market position of US cotton may be partially explained by Chin's perceptions on quality of American cotton.

A look at the cross-price effects in Table IV shows that all values related to Egypt are positive, which indicates that Egyptian cotton is substitutable for cotton imports from all other regions. Specially, the estimated cross price elasticity for Egyptian and US cotton is 2.05 which suggest that Egyptian cotton is a strong substitute for US cotton, but the reverse is not true. This means that a 1 percent increase in the price of US cotton, *Ceteris paribus*, would lead to a 2.05 percent increase in the quantity demanded of Egyptian cotton. Partially, this means that China tends to switch to Egyptian cotton when US cotton becomes relatively more expensive. But, an increase in the Egyptian cotton price relative to the US price does not encourage the substitution of Egyptian cotton with US cotton.

While results suggest that the demand for Egyptian cotton is more sensitive to changes in its own price, and given that the Egyptian cotton is a substitute for US cotton, together these results imply that China's demand for Egyptian cotton may be improved by lowering its prices. This can be achieved by increasing production efficiency and becoming more cost competitive.

It should be mentioned that some estimates in our model give mixed results. For instance; cotton from both India and Benin was found to complement Egyptian cotton. While the complementarities among exporters appear implausible, our findings associated with the cross-price elasticities should be viewed with caution given the low values of these estimates. The relatively small values of estimates suggest that these complementarities are relatively inelastic.

The price and expenditure elasticities in our study compare well with those obtained in other recent studies applying demand models to the Chinese market (e.g. Mohammad *et al.*, 2012). However, we believe that the relationship between USA and other competitors in the Chinese market has more to do with how the US prices can affect global prices rather than any substitute or competitive relationship in the Chinese market. However, caution should be exercised when comparing elasticities in different studies as different model specifications are applied.

4. Summary and concluding remarks

The paper aimed to examine the competitiveness of Egypt's cotton exports and to investigate the Chinese demand for Egyptian cotton in order to better understand the driving forces of Chinese cotton market and to capture the emerging opportunities that Egypt can gain from such a growing market. The competitiveness of Egypt's cotton exports was measured by employing Balassa's index of revealed comparative advantage and Vollrath's indices of revealed competitive advantage. An AIDS was then used, under iterative SUR setup, to estimate demand parameters for Chinese cotton imports from Egypt and major supply sources during the period 1992-2010. Parameter estimates were then used to determine the expenditure, own price elasticities, and cross-price elasticities.

We found that: Egypt has experienced dramatic declines in its cotton comparative advantage and competitiveness over the analyzed period; Egypt's market share is positively affected by both own and US export prices, but negatively influenced by export prices of other competitors in the Chinese market; demand for Egyptian cotton is expenditure inelastic and thus China would favor cotton imports from other suppliers, especially from USA; Egyptian cotton is substitutable for cotton imports from all other regions, especially for US cotton; and demand for Egyptian cotton is more sensitive to price changes and there is a greater tendency for China to switch Egyptian cotton than the other way around should relative prices change.

Based on these results, the following policy recommendations can be drawn to improve the competitiveness of Egyptian cotton exports and their access to the Chinese market: first, while Egypt's cotton competitiveness is declining, the country may attempt to exploit forms of competition other than comparative advantage, such as product differentiation and improved quality. To achieve this objective, Egypt should implement appropriate management and marketing strategies as well as embark on research and promotion which would help improve its position in the Chinese market; second, while Egyptian cotton is sensitive to its own prices, the other option for

Egyptian policy makers is to increase production efficiency along the supply chain to lower costs and become more price competitive and therefore this could stimulate cotton exports to China.

Note

1. The estimated results from the unrestricted model can be presented upon request.

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