

Original Research Article

Cotton Lint Export Trade in the Midst of Distortion: What are the Competitiveness Statuses of Major Players in the Industry? Case of 12 Selected Countries

ABSTRACT

Following recent protests in the world cotton production and export industry due to distortionary measures instilled by some major players in developed and some developing economies and the downward pressure such measures induce on world cotton prices, we sourced assessment of the competitiveness statuses of twelve major players in the industry. In so doing, we made use of export performance measures, specifically comparative export performance index (CEP), symmetric comparative export performance index (SCEP) and logarithmic form of the comparative export performance index, basing our decisions however on new thresholds proposed by the corresponding author in an earlier article. The results show that, although such distortionary measures (most importantly subsidies) are instilled with a purpose of protecting respective local industries, they generally turn-out not only harming players from other economies, but also “pushes-out” extra revenues that may have been earned by the countries that instill them. Consequently we find a more or less negative association between levying of subsidies and competitiveness. Based on seven-year mean index values used and new thresholds employed, we found Burkina Faso, Uzbekistan, Mali, Chad, Benin, Cameroon and India to be “Highly Competitive”. The United States (US), Australia, and Côte d'Ivoire were found “Competitive”. Brazil and China were on the other hand found “Weakly Competitive” and “Uncompetitive” respectively. By this, subsidies do not always enhance performance, but could as well yield some detrimental implications on export performance for countries that levy them (especially for leading exporters); an issue usually ignored in most competitiveness assessments.

Keywords: Competitive advantage; market share; nominal rate of assistance; thresholds

1. INTRODUCTION

As fragile as agricultural production and trade looks, agriculture as an activity and sector is not only sensitive to climatic and atmospheric conditions, but it is as well steered by forces operating in the marketing, economic and policy environments. Upon this claim, governments in several countries worldwide have in diverse ways intervened in food and agricultural markets with a purpose of enhancing food security, reducing poverty and increasing foreign exchange earnings. In as much as attempts have been made over the past three decades to justify such interventions, the instilled measures have been generally welfare reducing both within and beyond the respective economies in which such interventions are witnessed [1]. A commodity that has been subjected to such interventions worldwide and has for some time now attracted much research attention is cotton. Its

attraction of research attention is justified on the grounds that, in most of the developing economies where the commodity is produced, it is widely regarded a strategic crop for reducing poverty, enhancing food security and founding economic development [2]. In West and Central Africa for example, specifically the C-4 economies (Burkina Faso, Benin, Mali and Chad), the cotton industry is believed to have as of the year 2005 employed about 16 million people who were engaged in production, processing and trading of the commodity [3]. In these countries, besides farmers and cotton exporting companies facing various financial, management and technological challenges, the farmers (who primarily depend on cotton production for sustenance) are as well subjected to significant production taxes, thereby reducing the share of world price that reach them [4].

In contrast to this observation however, production in the relatively better-off economies have been mostly subsidized. As shown in *Figure 1*, cotton production in West and Central African countries has over the period 1980 to 2008 been generally subjected to production tax, whiles completely the opposite was observed for the United States and India. In as much as farmers in Brazil and China were subjected to production tax during the period 1980 to 1995, production in Brazil has since the year 1996 been subjected to some subsidy (although below percentages for India and the United States), with same being noted in China after the year 2004. Besides potentially creating inefficiency in production, through encouraging overproduction, subsidies are believed to create a glut that lowers world prices of the commodity [5, 6, 7, 8]. This adversely affects over 10 million farmers and export companies in the relatively poorer countries (who are rather taxed). In a country like Australia, however, the government has almost been neutral in this case as the annual nominal rate of assistance figures lie generally on the zero line.

Following protests by various countries, most importantly the C-4, that subsidies and other trade distortionary measures be abolished, several dimensions of cotton export trade have been researched to inform policy decisions on the way forward. In spite of the numerous researches conducted so far, very little has been done to ascertain the competitiveness statuses of these countries in the midst of prevailing distortions. The current study sources to bridge this gap through development and comparison of Comparative Export Performance and Symmetric Comparative Export Performance indices for twelve countries (the United States, India, Australia, Uzbekistan, Brazil, China, Burkina Faso, Benin, Cameroon, Côte d'Ivoire, Chad and Mali). Selection of these countries is based on the roles they play in world cotton production and trade. With exports of cotton being mostly in the form of lint (e.g. over 83% for C-4 countries), emphasis on cotton exports in this study would solely be placed on the lint component. Comparison of competitiveness across the respective countries would be based on new thresholds proposed by [9].

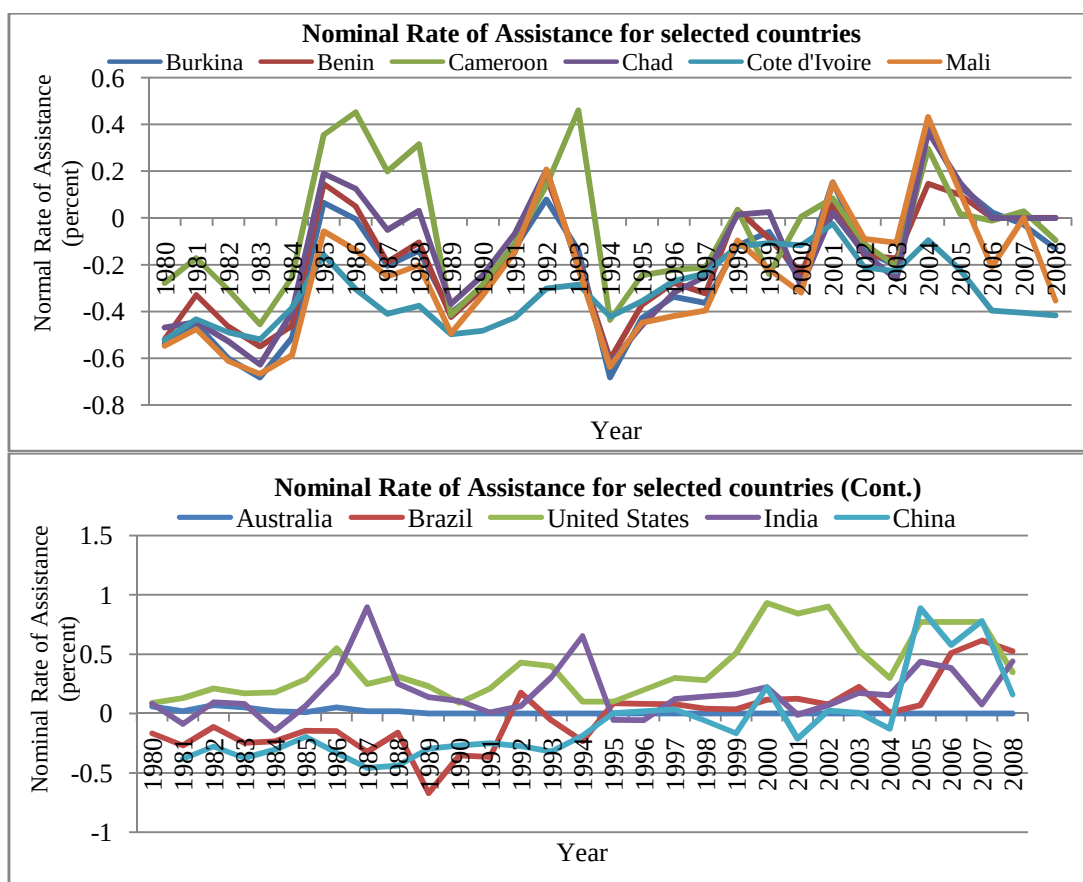


Figure 1 Nominal rate of assistance for cotton output
Data source: Anderson and Nelgen [10]

2. DEVELOPMENTS IN WORLD COTTON LINT EXPORTS

Amongst all the known fibres in the world, cotton is the most important with a share of about 40% of production [11] and represents an essential contributor to development in many developed and developing economies around the globe. Cotton as an important cash crop has for over three decades now in its export dimension undergone some major developments at the world, regional and national levels. Both the volume and value of world cotton lint exports have increased tremendously over the period 1980 to 2011, primarily due to increasing demand for the commodity and overproduction by major players. As show in *Table 1*, the volume of cotton lint exports at the global level is noted to have increased from 4,694,604 tonnes in 1980-1989 to 7,976,507.50 tonnes in 2010-2011. This development was enhanced possibly by exports from the Americas and Asia, as these two regions are as well noted to have witnessed major increases in volume and value of exports. With volume of world exports increasing by about 69.91% between the two aforementioned periods, volumes from the Americas and Asia increased respectively by 100.93% and 141.77%. The volume of cotton exports from Africa increased in absolute terms over the three decades between the years 1980 and 2009 (thus 1980-1989, 1990-1999 and 2000-2009), but decreased during the period 2010-2011. In as much as exports both in terms of absolute value and share for Europe have decreased continuously over the period 1980 to 2011, entirely the opposite is observed for Oceania.

95 Table 1 Regional (and country) shares in volume (tonnes) of world cotton lint exports
96

Region	1980 - 1989	1990-1999	2000-2009	2010-2011
World	4,694,604.00	5,466,825.70	7,166,301.40	7,976,507.50
Americas	1,806,247.20 (38.47)	1,953,859.90 (35.74)	3,099,353.40 (43.25)	3,629,340.50 (45.50)
Asia	1,096,384.50 (23.35)	1,779,856.80 (32.56)	2,025,717.60 (28.27)	2,650,734.00 (33.23)
Africa	721,885.90 (15.38)	822,329.50 (15.04)	1,170,417.50 (16.33)	813,831.50 (10.20)
Europe	920,903.00 (19.62)	464,510.50 (8.50)	355,400.80 (4.96)	247,228.50 (3.10)
Oceania	149,183.40 (3.18)	446,269.00 (8.16)	515,412.10 (7.19)	635,373.00 (7.97)
Sub-Region				
West Africa	209,185.90 (4.56)	423,248.00 (7.74)	651,957.30 (9.10)	468,303.50 (5.87)
Middle Africa	78,430.10 (1.67)	120,806.00 (2.21)	129,697.70 (1.81)	71,236.00 (0.89)
Countries				
United States	1,254,106 (26.71)	1,497,525.70 (27.39)	2,687,170.20 (37.50)	2,868,248.50 (35.96)
India	66,830.70 (1.42)	124,388.60 (2.28)	529,803.80 (7.39)	1,718,328.50 (21.54)
Australia	149,181.60 (3.18)	446,268.90 (8.16)	515,410.90 (7.19)	635,373.00 (7.97)
Uzbekistan	- -	*719,207.40 (13.16)	727,985.30 (10.16)	353,400.50 (4.43)
Brazil	81,456.00 (1.74)	32,926.00 (0.60)	294,467.00 (4.11)	635,413.00 (7.97)
China	310,694.90 (6.62)	136,569.00 (2.50)	82,271.10 (1.15)	52,804.50 (0.66)
Burkina Faso	35,254.30 (0.75)	44,586.60 (0.82)	162,072.00 (2.26)	161,604.00 (2.03)
Benin	23,086.00 (0.49)	86,757.00 (1.59)	128,137.00 (1.79)	59,812.00 (0.75)
Cameroon	29,210.20 (0.62)	51,946.80 (0.95)	82,817.90 (1.16)	54,702.00 (0.69)
Côte d'Ivoire	59,484.10 (1.27)	95,932.00 (1.75)	106,876.50 (1.49)	77,354.50 (0.97)
Chad	37,370.00 (0.80)	59,000.00 (1.08)	43,499.50 (0.61)	12,728.50 (0.16)
Mali	61,219.50 (1.30)	121,543.40 (2.22)	178,688.20 (2.49)	67,694.50 (0.85)

97 Numbers in bracket are representative shares (percentages)

98 - Data not available

99 * Decadal average but with missing values for 1990-1991

100 Source: Authors computation with data from FAO (FAOSTAT –Agricultural Trade Data)

101
102 At country level, the United States remains leading exporter of the commodity over
103 three decades within the period 1980 to 2009 and for the period 2010-2011. For the
104 respective decades, the United States held shares of 26.71%, 27.39% and 37.50%, holding
105 a share of 35.96% as well for the period 2010-2011. Taking a closer look at figures in *Table*
106 *1*, it is quite evident that the countries outside West and Central Africa (WCA) region are
107 generally major exporters of cotton lint, and this did not happen by chance. Most of the
108 increases observed in export volume for these countries have been enhanced through
109 government interventions (distortions) in the form of subsidies purported on facilitating
110 increased cotton production [11]. It is as well noted that in as much as absolute volumes of
111 export from West Africa and Middle (Central) Africa (WCA) have both increased over the
112 three decades between 1980 and 2009, share-wise, that for the former has been a
113 continuous increase while that for the latter has been a fluctuation. For the period 2010-
114 2011, West and Central African countries accounted for a total of 66.30% of cotton lint
115 exports from Africa. Considering countries in West and Central Africa individually for the
116 period 2010-2011, exports from Burkina Faso accounted for 2.03% of global exports, Côte
117 d'Ivoire 0.97%, Mali 0.85%, Benin 0.75%, Cameroon 0.69% and Chad 0.16%. Due to
118 decades of development efforts, cotton indeed became a dominant cash crop in WCA during
119 the decades 1990-1999 and 2000-2009. Historically, cotton production has two
120 characteristics in Sub-Saharan Africa: vertical coordination and the fact that cotton has been
121 a major export cash crop for decades [12]. These two characteristics led to a strong
122 government intervention in cotton supply chains. Although the commodity still plays
123 significant part in economic development of these countries, respective export shares on the
124 global pedestal for all these countries decreased during the period 2010-2011 compared to
125 the period 2000-2009.

Table 2 displays the distribution of export earnings from cotton lint at global, regional and national scales. Globally, earnings from cotton lint exports is noted to have increased from \$6,936,064.10 (thousand) to \$17,555,924.50 (thousand) between the periods 1980-1989 and 2010-2011. This represents an increase of 153.11%. As per the table, the Americas held the largest share of earnings from cotton over the three decades between 1980 and 2009, and for the period 2010-2011. Comparatively, shares in value of exports were significantly higher in non-WCA countries than in WCA countries. West and Central Africa jointly accounted for 5.54% of global export earnings for the period 2010-2011, while Africa as a continent/region accounted for 9.21%. By this, West and Central Africa accounted for 60.21% of total earnings from cotton lint exports for Africa. This comparatively smaller share of WCA sub-region in global exports may be attributed partly to unfavorable conditions in the world cotton lint markets and domestic institutional and structural constraints, mostly with poor price transmission (which discourages farmers from expanding and intensifying production of the commodity). In support of this attribution, [11] revealed that, even though cotton production has expanded rapidly in the WCA sub-region, the share of the international price paid to producers in WCA has been relatively low. In addition, inefficiencies have been noted in other cotton related activities like ginning, marketing and input distribution.

Table 2 Regional (and country) shares in value (\$1000) of world cotton lint exports

Region	1980 - 1989	1990-1999	2000-2009	2010-2011
World	6,936,064.10	8,030,048.60	8,964,869.00	17,555,924.50
Americas	2,677,418.10 (38.60)	3,015,909.00 (37.56)	3,983,129.80 (44.43)	8,561,829.00 (48.77)
Asia	1,396,768.00 (20.14)	2,398,207.90 (29.87)	2,386,746.00 (26.62)	5,076,413.00 (28.92)
Africa	1,170,422.00 (16.87)	1,233,388.00 (15.36)	1,481,620.00 (16.53)	1,617,539.00 (9.21)
Europe	1,495,955.90 (21.57)	702,976.50 (8.75)	441,146.10 (4.92)	582,513.00 (3.32)
Oceania	195,500.50 (2.82)	679,567.40 (8.46)	672,226.70 (7.50)	1,717,631.00 (9.78)
Sub-Region				
West Africa	271,443.90 (3.91)	606,062.50 (7.55)	765,651.20 (8.54)	839,725.00 (4.78)
Middle Africa	105,435.90 (1.52)	173,585.90 (2.16)	155,524.30 (1.73)	134,228.00 (0.76)
Countries				
United States	1,962,283.10 (28.29)	2,407,539.20 (29.98)	3,499,019.30 (39.03)	7,086,408.00 (40.36)
India	88,854.60 (1.28)	159,845.20 (1.99)	693,544.90 (7.74)	3,183,944.00 (18.14)
Australia	195,496.00 (2.82)	679,566.00 (8.46)	672,217.00 (7.50)	1,717,631.00 (9.78)
Uzbekistan	-	*972,564.50 (12.11)	808,790.50 (9.02)	728,172.50 (4.15)
Brazil	78,738.00 (1.14)	41,611.70 (0.52)	355,014.00 (3.96)	1,205,805.00 (6.87)
China	387,828.00 (5.59)	206,554.00 (2.57)	101,966.00 (1.14)	103,495.00 (0.59)
Burkina Faso	40,142.10 (0.58)	58,860.50 (0.73)	190,413.70 (2.12)	243,755.50 (1.39)
Benin	27,964.00 (0.40)	124,777.00 (1.55)	151,016.00 (1.68)	122,519.00 (0.70)
Cameroon	38,163.50 (0.55)	69,267.90 (0.86)	100,680.50 (1.12)	97,485.50 (0.56)
Côte d'Ivoire	84,036.20 (1.21)	139,714.40 (1.74)	123,738.10 (1.38)	131,508.50 (0.75)
Chad	52,771.00 (0.76)	89,061.00 (1.11)	51,679.00 (0.58)	29,961.00 (0.17)
Mali	80,080.00 (1.15)	166,054.00 (2.07)	214,715.00 (2.40)	151,599.00 (0.86)

Numbers in bracket are representative shares (percentages)

- Data not available

*Decadal average but with missing data for 1990-1991

Source: Authors computation with data from FAO (FAOSTAT –Agricultural Trade Data)

With WCA countries having been identified to be low cost producers of cotton after countries like Brazil, Pakistan, Turkey and Australia [5], it may be anticipated without prior knowledge of prevailing international market conditions that countries in WCA are price competitive and should earn high revenues due to increasing demand for cotton. This however has not been the case, partly due to heavy production subsidies levied on production in countries like USA, India, and China. Such intervention distorts pricing on the

international market and adversely affects cotton revenues received by growers in WCA. The inability of WCA countries to earn high revenues has as well been attributed to the fact that cotton reforms in countries within WCA are far less advanced compared to reforms undertaken by cotton producing countries in Eastern and Southern Africa [13]. In addition, countries in WCA have been rendered price takers due to their relatively smaller shares and to prevailing conditions on the international market.

3. METHODOLOGY

In this section, we discuss the basic foundations for the measures of competitiveness employed in our analysis and the data used. We begin the section with discussion on the relevant foundations and thereafter provide brief information on data used and sources.

3.1 Measuring Competitiveness

Diverse opinions have been expressed in business and trade literature by experts on the definition of competitiveness and how best the concept can be measured. In this study however, we stick to the definition proposed by [14], who defines competitiveness as the ability of a country (a firm/or an entity) to offer products and services that meet local and international quality standards, worth domestic and global market prices and provide adequate returns on the resources used in producing them. By this definition, the term competitiveness covers four important aspects of trade and production; quantity (through offering of adequate volumes of a commodity), quality, price and efficiency. To be competitive in a commodity, a country (firm/entity) is expected to offer an adequate quantity of that commodity in high quality (which attracts higher demand). This consequently sets ground for higher prices (and possibly premium¹). In as much as the quality and price aspects are important, the concept by the definition above tries to draw the reader's attention to the fact that achieving anticipated quality standards and high prices involves efficient production, processing and marketing in the first place. These four dimensions should hold for a country/firm to be deemed competitive in a commodity both at the local and global scales. As a relative measure of performance, the most important index amongst the lot that comes to mind in expressing competitiveness is the Balassa index. Since the proposition of this index by [15], its definition has been revised and modified in several ways, leading to a plethora of measures [16]. By its original definition however, the Balassa index (also dubbed 'Revealed Comparative Advantage' (RCA)) is expressed as follows:

$$RCA_{ij} = \frac{(x_{ij}/x_{it})}{(x_{nj}/x_{nt})} \quad \text{eq. (1)}$$

Where X represents exports, *i* is a country, *j* is a commodity, *t* is a set of commodities and *n* is a set of countries. Blurrily perceived by most trade analysts and experts as a measure of comparative advantage, the definition of this index reflects success or failure of countries in exports of a commodity relative to world-wide norms [17]. Such successes and failures are mostly induced through subsidies and other distortionary measures or incentives. Thus, the index better reflects competitive advantage than comparative advantage. By the original definition as proposed by [15], the index is therefore more of a measure of competitive advantage than comparative advantage. Further derivations from this index will henceforth be a reflection of competitive advantage. In spite of being the foundation for development of various indices of competitiveness, the Balassa index is foremost flawed by deviation in index value observed as the set of countries used as reference changes. This makes the outcomes context and reference specific and sensitive to reference definition. The

¹ Premium in this context refers to a price that is higher than the regular price (thus, a high or extra value)

asymmetric nature of the index poses another flaw in its use. Should a country be found uncompetitive, the index value for such country ranges between zero and value less than 1. For competitive countries, the index ranges from one to infinity. The index is as well susceptible to double counting between pairs of countries. It is as well criticized for ignoring the import side of trade.

In building on this index and addressing identified flaws in the process, [18] offered three alternative specifications, namely the logarithm of relative export advantage ($\ln(RXA)$, which holds a definition similar to the original Balassa index but uses the world as a reference to avoid double counting between pairs of countries and addresses the asymmetry problem of the Balassa index), relative trade advantage ((RTA), which incorporates both the export and import (relative import advantage (RMA)) dimensions of trade) and revealed competitiveness ((RC), which holds a definition similar to the RTA but uses the logarithms of relative export and import advantages). The respective alternatives are expressed as follows:

$$\ln(RXA_{ij}) = \ln \frac{(X_{ij}/X_{it})}{(X_{nj}/X_{nt})} \quad \text{eq. (2)}$$

$$RMA_{ij} = \frac{(M_{ij}/M_{it})}{(M_{nj}/M_{nt})} \quad \text{eq. (3)}$$

$$RTA_{ij} = RXA_{ij} - RMA_{ij} \quad \text{eq. (4)}$$

$$RC_{ij} = \ln(RXA_{ij}) - \ln(RMA_{ij}) \quad \text{eq. (5)}$$

Where X represents export, M represents import, i represents country, j stands for commodity, n represents world and t stands for all product groups.

Following the proposition by [18] of these alternatives however, claims have been made in trade literature on the failure of either alternatives to appropriately correct for/capture the effect of government intervention and other distortionary measures on trade. Prior to proposition of these alternatives, [19] found that a country's performance in exports of a commodity is more affected by economic fundamentals than by government intervention, whereas the reverse holds for import behavior. Along this argument, [18] recommended the use of the $\ln(RXA)$ and RXA in preference to the RTA and RC as appropriate measures for assessing export performance. This recommendation is backed by a suggestion that the $\ln(RXA)$ and RXA are less susceptible to policy-induced distortions. In addition to this suggestion, considering a single commodity, it is noted that most countries engage either in inter-industry trading (thus complete exports or imports) or irregularly/weakly engage in intra-industry trading. This could to a greater extent preclude the use of the RTA and RC as these measures may automatically converge to either RXA , RMA , $\ln(RXA)$ or $\ln(RMA)$ when there are zero imports or exports.

Along this line our analysis is founded on the RXA and $\ln(RXA)$ measures of competitiveness. Although deemed more appropriate among the alternatives proposed by [18], cross-sectorial distortions stand determining the outcome of the final index values observed. This could lead to misleading outcome for the index values observed. This claim is made on the grounds that, by the definition in eq. (2), in determining the performance of a country in exports of a commodity, use is made of "all product groups" as a divisor both at the national and world levels. To avoid such cross-sectorial influence, we make use of a more sector bound version of the RXA measure of competitiveness. By this, we use the Comparative Export Performance Index (CEP), its logarithmic form (the $\ln(CEP)$) and the Symmetric Comparative Export Performance Index (SCEP). These measures are expressed as follows:

$$CEP_{ij} = \frac{(X_{ij}/X_{it})}{(X_{nj}/X_{nt})} \quad \text{eq. (6)}$$

$$\ln (CEP_{ij}) = \ln \frac{(X_{ij}/X_{it})}{(X_{nj}/X_{nt})} \quad \text{eq. (7)}$$

$$SCEP = \frac{(CEP_{ij} - 1)}{(CEP_{ij} + 1)} \quad \text{eq. (8)}$$

Where conceptually X represents value of exports, i represents country, j stands for cotton lint, n represents world and t stands for value of total agricultural exports. In as much as the $\ln(CEP)$ yields values that are symmetric through the origin, the SCEP yields values that fall within the bounds of -1 and +1. The closer a country is to the +1 bound, the higher the country's competitive advantage in exports of cotton lint. The opposite holds for countries with values closer to the -1 bound. With a similar index interpretation as the RXA and RCA, CEP values ≥ 1 reveal competitiveness. Similarly, the $\ln(CEP)$ measure holds a similar index interpretation as the $\ln(RXA)$, where index value ≥ 0 reveal competitiveness. Noted in trade literature, in informing decision on the competitiveness status of a country in export of commodities, use has been made by several researchers of fewer randomly selected years (usually two or three years including [20]). In their study on "Market analysis and revealed comparative advantage", [20] had an RCA value in Kiwifruit of 1.0 for Iran in the year 2000, 23.3 in the year 2005 and N/A for the year 2009. Should the value for 2009 have turned out to be for example a value less than 1, what interpretation would analysts attach to such outcome? We believe, as usual, they would suggest the country is no more competitive based on the annual figures on which they base their decision. There could have been a possibility that values for the years between 2001-2004 and 2006-2008 were all above 1 or possibly below 1. Ignoring all these possibilities as we inform decision on the competitiveness statuses of countries could be misleading.

Along this line, we make use of mean index values of the last seven continuous years (for which data is available) in informing the performance of the respective countries instead of using random years. This helps capture extremes (which usually mislead analysts who use annual figures for random periods) and their effect on preceding and subsequent years. Use of the $< \geq 1$, $< \geq 0$, and -1 to +1 bounds respectively of the CEP, $\ln(CEP)$ and SCEP in interpreting outcomes is deemed less informative and provides no room for accessing the effectiveness of policy measures purported on enhancing or depressing exports. Accordingly we make use of seven-year-mean index thresholds proposed by [9] for informing decisions in this study.

Table 3 Seven-year-mean index thresholds for assessing competitive advantage

Classes	CEP	Ln (CEP)	SCEP
Highly Competitive	≥ 4.20	≥ 1.44	0.62 -1.00
Competitive	1.73 – 4.19	0.55-1.43	0.27 – 0.61
Weakly Competitive	1.00 – 1.72	0.00 – 0.54	0.00 -0.26
Uncompetitive	< 1.00	< 0.00	< 0.00

Source: Boansi [9]

Having been used already by [9] in assessing the performance of exports for seven agricultural commodities during and after the agricultural diversification project in Ghana, these thresholds were not just randomly selected. The bounds were set at the respective upper and lower limits after several rotations for robustness. By this, for a country to move from one class to another would require great effort in the form of efficient policy instruments, reduction of existing inefficiencies, improvement in trade (including appropriate liberalization of internal and external marketing) and minimization of distortionary measures which according to [21] reduces competitiveness. Although applied to the agricultural sector, these thresholds are valid for other sectors as long as definitions for the measure(s) used conform to those in eq. (6) to (8) and are sector bound. When used in policy analysis, the thresholds could serve as useful guide in evaluating the effectiveness of various policy

instruments purposed on enhancing export growth. Besides being quite effective in reflecting fragileness of export trade, these thresholds could be used to identify inefficiencies in export trade in less diversified and highly trade distorting environments and sectors.

3.2 Data and Sources

In this study, use is made primarily of secondary data on national and world values for cotton lint and total agricultural exports. Data on these variables were gathered from the agricultural trade database of FAO (FAOSTAT). A total of 12 countries are covered in our analysis and these are the United States, India, Australia, Uzbekistan, Brazil, China, Burkina Faso, Benin, Cameroon, Côte d'Ivoire, Chad and Mali. The mean index for the respective countries covers the years 2005, 2006, 2007, 2008, 2009, 2010 and 2011.

4. RESULTS AND DISCUSSION

Although our ultimate stands on the competitiveness statuses of the respective countries are based on the seven-year-mean index values and along the thresholds proposed, we first discuss the results based on the bounds of the original RXA and $\ln(RXA)$ indices from which our measures (CEP, SCEP and $\ln(CEP)$) were derived.

In interpreting the results, index values observed reveal that, with the exception of Brazil and China, all the other countries covered in this study are competitive in each year based on the $< \geq 1$ bound of the RXA (CEP in our case), $< \geq 0$ bound of the $\ln(RXA)$ ($\ln(CEP)$ in our case) and $< \geq 0$ bound of the SCEP (which in most studies holds the same interpretation as the Symmetric Revealed Comparative Advantage, or the Symmetric Relative Export Advantage). Although Brazil was found to be uncompetitive in the years 2005, 2006, and 2007, the country became competitive afterwards, with the years 2008, 2009, 2010 and 2011 being graced respective CEP indices of 1.36, 1.37, 1.00, and 1.26. The SCEP equivalents of these four years are 0.15, 0.15, 0.00, and 0.11, while equivalents for the $\ln(CEP)$ are given as 0.31, 0.3, 0.00, and 0.23. In the case of China however, all the index values observed were below 1.00 for the CEP index and below 0.00 for both the SCEP and $\ln(CEP)$, thereby making it uncompetitive throughout the seven years. Relatively higher index values were observed in countries like Burkina Faso, Uzbekistan, Mali, Chad, Benin, Cameroon and India. By this, all the "Cotton-Four" countries, in spite of the current challenges faced by their respective cotton industries, are noted to have higher competitive advantage over countries like United States (Which holds a market share of over 5 times that of West and Central Africa together), Australia, Côte d'Ivoire, Brazil and China (with the latter known to consume most of the cotton it produces within the country; hence engaging less in exports). Their respective competitive advantages have however been generally receding over the years 2005 to 2011. The higher competitive advantages for the C-4 countries, in spite of the recession, could be attributed to their relatively lower cost of production and exports compared to the US and other countries (like China) which have relatively higher cost of production and exports. In as much as cotton may be subsidized in US, reduction in world prices as a result of such intervention does not only harm producers and exporters in developing economies, but also, it reduces potential earnings to the US as well.

Taking a closer look at the detailed world trade flows in Appendix 1, the US is noted to have had about 46 export destinations for the period 2006-2010 compared to about 17 on average for West and Central African cotton exports. Consequently, flooding the market with "cheap cotton" does not only harm the other competing countries, but the US as well (an observation usually ignored in most studies). By the definition of the CEP index as provided in eq. (6), competitive advantage is measured by the value of cotton lint exports in total agricultural exports for the country compared to that for the world (the latter being a divisor).

Upon this definition, putting in place measures to increase the national value (and not volume) of exports of the commodity, may induce relatively higher effect at the national level than at the world level, thereby increasing the numerator in the equation for US. Subsidizing cotton production and exports for major players generally induce an inverse association between exports and competitiveness for the country that initiates such intervention and has as well adverse implications for other economically-constrained and cotton-production-and-export-dependent countries. Allowing the world cotton market to work things out by itself with reduced government interference could make the US and other cotton-production distorting countries better off than they actually now are. Although the primary goal for use of such intervention is to protect producers and exporters in the country, comparing market shares and the index values for the US and other countries, shows that, such interventions rather “push-out” some extra revenues the country may have earned in the absence of such distortion.

This discussion however, is not grounded by the bounds of the original RXA, In (RXA), and RCA as countries with values of ≥ 1 for RXA, RCA and CEP are deemed competitive in spite of their distance from 1 or infinity. Same applies for the other derived measures. Holding unto the intuition for interpreting values for the RCA (of Balassa), and RXA and In (RXA) (of Vollrath), as long as countries with index values equal to or above 1 for RXA or RCA or CEP are deemed competitive (because the competitive bound ranges between 1 and infinity), no further information is provided on how appropriate export-growth-related policy initiatives/instruments can be evaluated for efficiency and effectiveness. It is in response to this information gap that we make use of the thresholds proposed [9] to classify the twelve countries in order to provide a clearer picture on their competitiveness statuses and to reflect possibly the fragileness of being closer to a lower or upper limit of a specified bound.

Table 4 Performance of selected countries in cotton lint exports

Countries	Comparative Export Performance (CEP) Index, CEP							
	2005	2006	2007	2008	2009	2010	2011	Mean
United States	3.90	4.03	3.78	4.43	3.54	3.66	3.80	3.88
India	4.61	7.57	9.69	4.03	13.10	11.29	7.07	8.19
Australia	2.49	2.31	1.69	1.73	2.08	2.72	4.78	2.54
Uzbekistan	50.15	45.72	53.78	66.66	42.58	47.43	29.55	47.98
Brazil	0.95	0.62	0.90	1.36	1.37	1.00	1.26	1.07
China	0.07	0.13	0.14	0.16	0.16	0.14	0.15	0.14
Burkina Faso	49.67	50.62	60.53	84.60	72.10	46.35	34.91	56.97
Benin	41.90	20.30	30.25	35.09	24.75	12.38	13.01	25.38
Cameroon	14.33	11.03	12.39	8.09	9.73	5.48	6.49	9.65
Côte d'Ivoire	3.01	2.28	2.15	2.00	1.41	1.68	1.31	1.98
Chad	31.89	34.46	36.32	40.54	30.51	19.76	32.66	32.31
Mali	53.49	46.64	48.31	63.63	40.38	34.70	40.30	46.78
Countries	Symmetric Comparative Export Performance Index, SCEP							
	2005	2006	2007	2008	2009	2010	2011	Mean
United States	0.59	0.60	0.58	0.63	0.56	0.57	0.58	0.59
India	0.64	0.77	0.81	0.60	0.86	0.84	0.75	0.75
Australia	0.43	0.40	0.26	0.27	0.35	0.46	0.65	0.40
Uzbekistan	0.96	0.96	0.96	0.97	0.95	0.96	0.93	0.96
Brazil	-0.03	-0.23	-0.05	0.15	0.15	0.00	0.11	0.02
China	-0.87	-0.78	-0.75	-0.73	-0.73	-0.75	-0.74	-0.76
Burkina Faso	0.96	0.96	0.97	0.98	0.97	0.96	0.94	0.96
Benin	0.95	0.91	0.94	0.94	0.92	0.85	0.86	0.91
Cameroon	0.87	0.83	0.85	0.78	0.81	0.69	0.73	0.80
Côte d'Ivoire	0.50	0.39	0.37	0.33	0.17	0.25	0.14	0.31
Chad	0.94	0.94	0.95	0.95	0.94	0.90	0.94	0.94
Mali	0.96	0.96	0.96	0.97	0.95	0.94	0.95	0.96

	Log of Comparative Export Performance Index, ln (CEP)							
United States	1.36	1.39	1.33	1.49	1.26	1.30	1.33	1.35
India	1.53	2.02	2.27	1.39	2.57	2.42	1.96	2.02
Australia	0.91	0.84	0.53	0.55	0.73	1.00	1.56	0.87
Uzbekistan	3.91	3.82	3.98	4.20	3.75	3.86	3.39	3.85
Brazil	-0.05	-0.47	-0.1	0.31	0.31	0.00	0.23	0.03
China	-2.67	-2.07	-1.93	-1.85	-1.86	-1.94	-1.90	-2.03
Burkina Faso	3.91	3.92	4.10	4.44	4.28	3.84	3.55	4.01
Benin	3.74	3.01	3.41	3.56	3.21	2.52	2.57	3.14
Cameroon	2.66	2.40	2.52	2.09	2.27	1.70	1.87	2.22
Côte d'Ivoire	1.10	0.83	0.77	0.69	0.34	0.52	0.27	0.65
Chad	3.46	3.54	3.59	3.70	3.42	2.98	3.49	3.46
Mali	3.98	3.84	3.88	4.15	3.70	3.55	3.70	3.83

Source: Authors computation with data from FAOSTAT

The picture portrayed so far is based on linking of our initial interpretation to the mean index values for the seven continuous years instead of using fewer randomly selected years as seen in some studies (which keep readers in suspense/at sea on the values for intermediate years). However, as noted in the table above, there are quite some wide variations between the highest and lowest indices for most of the countries, and these variations usually mislead analysts in interpreting index values when values are interpreted based on annual figures. To capture such yearly deviations, we inform decision on the statuses of the respective countries based on mean index values for the seven-year period.

Based on the thresholds from Table 3 (and repeated in Table 5), the twelve countries were placed under four distinct classes based on their seven-year-mean index values. The classes used are “Highly Competitive”, “Competitive”, “Weakly Competitive” and “Uncompetitive”. Countries with mean index values < 1 for CEP and < 0 for $\ln(\text{CEP})$ and SCEP are classified as uncompetitive. Countries with mean index values between 1.00-1.72 for CEP, 0.00-0.26 for SCEP and 0.00-0.54 for $\ln(\text{CEP})$ are classified as “Weakly Competitive”. The use of the term “Weakly Competitive” is to reflect the fragileness of being in this category. Inappropriate policy interventions, shocks from the market, inefficiencies in fiscal and marketing environment and other socio-economic, financial and structural constraints on the part of producers and exporters could pull a country into the “Uncompetitive” class. More **‘favorable’** conditions can however push a country into a higher class (Possibly the “Competitive” class and “Highly Competitive” class if such conditions are extremely favorable). The use of “Competitive” for the next class is to reflect the fact that, although countries (in this case) in this category are by the original bounds from the RCA deemed competitive, there exists room for improvement by addressing some existing inefficiencies in their respective industries and lending more attention to the industry in a non-distorting way. Although such countries are usually less concentrated on the cotton industry, they could improve on the competitiveness statuses of their respective sub-sectors by addressing existing inefficiencies, the outcome of which could reflect in their movement from the “Competitive” class to a “Highly Competitive” class. Countries in the “Highly Competitive” class are usually more dependent on cotton industry for sustenance, income generation, poverty reduction and foreign exchange earnings, and are potentially low cost producers due to abundance of relevant resources needed. Although relatively less dependent on cotton exports (as shown in Appendix 2) compared to the C-4 countries and Uzbekistan, Cameroon and India are found to be “Highly Competitive”, possibly due to favorable production and export conditions. India is however, closer to the lower limit of this class than the other countries, and is advised therefore to work on reducing existing inefficiencies in the sub-sector (most importantly to minimize distortions which indirectly drive world cotton prices down, as the country happens to be the second largest exporter among the 12 countries considered and has about 27 export destinations (see Appendix 1)).

417 Using the seven year-mean index values, and bounds for all the three measures
 418 employed, in a descending order, Burkina Faso, Uzbekistan, Mali, Chad, Benin, Cameroon
 419 and India are found “Highly Competitive”. The United States, Australia and Côte d'Ivoire are
 420 found “Competitive”. Brazil is found “Weakly Competitive”, while China is “Uncompetitive”.

421 Table 5 Competitiveness statuses of major players in world cotton industry based on new thresholds

Threshold				Countries
• Classification under				
	CEP	SCEP	ln (CEP)	
Highly Competitive	(≥ 4.20)	(0.62 – 1.00)	(≥ 1.44)	Burkina Faso, Uzbekistan, Mali, Chad, Benin, Cameroon, India,
Competitive	(1.73 – 4.19)	(0.27 – 0.61)	(0.55 -1.43)	United States, Australia, Côte d'Ivoire
Weakly competitive	(1.00 – 1.72)	(0.00 – 0.26)	(0.00 – 0.54)	Brazil
Uncompetitive	(< 1.00)	(<0.00)	(< 0.00)	China

422 Source: Authors classification based on thresholds proposed by [9]

423

424 5. CONCLUSION

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426 Following recent debates in economic and trade literature on distortions in world
 427 cotton industry and their impacts on producers and exporters in developing economies, we
 428 tried to bridge information gap on the competitiveness statuses of twelve major players in the
 429 global cotton industry. Along this line, we made use of seven-year-mean index values as
 430 against the fewer randomly selected years used by various analysts in trade literature. Our
 431 ultimate decision on the respective statuses was however based on new thresholds
 432 proposed by [9], and according to the four unique classes therein. The results reveal that in
 433 spite of current challenges faced by producers and exporters in developing economies, in
 434 part due to price-influencing distortions triggered by major players in the industry and
 435 prevailing domestic inefficiencies in production and marketing, countries from West and
 436 Central Africa (with the exception of Côte d'Ivoire and others not covered in this study),
 437 Uzbekistan and India are “Highly Competitive” in exports of cotton lint. Alongside side
 438 Australia and Côte d'Ivoire, the United States is observed to be “Competitive” and not
 439 “Highly Competitive” in spite of the higher market share it holds. This has in this study been
 440 attributed to the indirect adverse impact of price-influencing distortions (in the form of
 441 production and export subsidies) used by the country, which consequently “pushes-out”
 442 some extra revenue the country could have earned in the absence of such distortionary
 443 measures. Brazil was found “Weakly Competitive”, and China “Uncompetitive”. By this, we
 444 conclude that, although subsidies and other distortionary measures may be initially
 445 introduced with a purpose of protecting a local industry, they generally turn out not only
 446 harming other competing countries, but as well harm the country in which such initiatives are
 447 instilled. Accordingly, we note a more or less inverse association between levying of subsidy
 448 and competitiveness status. Upon the market share they hold, the US and India (because of
 449 being closer to the lower limit than other countries in the “Highly Competitive” Class) could
 450 improve on their current statuses by addressing existing inefficiencies within their respective
 451 economies and on the world market due the downward pressure induced on world cotton
 452 prices by subsidies levied in their respective economies. Although a high cost producer and
 453 a subsidy-levying economy, we make no recommendation in the case of China because, in
 454 spite of being a larger producer of the commodity, we observed average share of 0.17 (over
 455 the period 2005-2011) for cotton lint in agricultural exports. This signifies that, most of the

cotton lint produced is as well consumed within the country (see Appendix 2). Should China however consider prioritizing the well-being of farmers and exporters from other developing economies in its policy formulation, we believe minimizing the use of subsidies could be one way out. Brazil as well needs to work towards improving its competitiveness as it is the most fragile amongst the lot in competitiveness for cotton lint exports.

COMPETING INTERESTS

No competing interests exist

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APPENDIX 1: Detailed World Trade Flows for Cotton Lint Exports

Country	Export destinations for the period 2006-2010			
	Between 0% and 1%	Between 1% and 10%	Between 10% and 25%	Between 25% and 100%
United States	Canada, Brazil, Venezuela, Colombia, Ecuador, Peru, Bolivia, Argentina, Chile, Iceland, United Kingdom, Norway, Finland, Russian Federation, Poland, Germany, France, Belgium, Netherlands, Spain, Italy, Switzerland, Morocco, Senegal, Liberia, Togo, Tunisia, Egypt, Saudi Arabia, Congo DR, Angola, Pakistan, India, Cambodia, Malaysia, Philippines, Japan, Australia, New Zealand	Mexico, Turkey, Bangladesh, Thailand, Vietnam, Indonesia	China	
India	United States, South Africa, Togo, Congo Republic, Tanzania, Kenya, Eritrea, Saudi Arabia, Oman, Turkey, Greece, Italy, France, Germany, Belgium, Netherlands, France, United Kingdom, Nepal, Thailand, Malaysia,	Pakistan, Indonesia, Bangladesh		China

	Japan, Korea Republic			
Australia	India, Brazil, United States, Pakistan, Turkey, Italy, Malaysia, Philippines	Japan, Korea Republic, Indonesia, Thailand, Bangladesh	China	
Uzbekistan				
Brazil	United States, Venezuela, Ecuador, Bolivia, Paraguay, Chile, Morocco, Portugal, Algeria, Italy, Germany, France, Belgium, Netherlands, Switzerland, India, Korea Democratic People's Republic, Malaysia, Philippines	Thailand, Vietnam, Japan, Bangladesh, Turkey, Argentina	China, Indonesia, Korea Republic	
China		Nigeria, India, Pakistan, Bangladesh, Myanmar, Indonesia, Thailand, Vietnam, Japan, Korea Republic		Korea Democratic People's Republic
Burkina Faso	Cote d'Ivoire, Germany, Greece, Turkey, India, China, Pakistan, Indonesia	Togo	France, Belgium, Netherlands, United Kingdom	Switzerland
Benin	Turkey, Bangladesh, Tunisia, Morocco, Spain, France, Germany, Italy	Pakistan, Indonesia, Malaysia, Thailand, Vietnam, Portugal	China	
Cameroon	Nigeria, Morocco, Portugal, France, Germany, Belgium, Italy, Greece, Bulgaria, United Arab Emirates, Pakistan, India, Japan	Indonesia, Turkey, Bangladesh	China	
Côte d'Ivoire	Philippines, United Area Emirates, Ghana, Morocco, Portugal, Spain, Tunisia, France, Germany, Belgium, Greece	Italy, Malaysia, Thailand, Bangladesh,	China, Indonesia, Vietnam	
Chad				
Mali	Malaysia, Tunisia, Portugal, Italy, France, Germany, Netherlands	Japan, Indonesia, Thailand, Vietnam, Bangladesh, India, Pakistan, Togo, Cote d'Ivoire, Morocco	China, Senegal	

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APPENDIX 2: Share of Cotton Lint by Value in Total Agricultural Exports (%)

Countries	Share of cotton lint exports by value in total agricultural exports (%)							
	2005	2006	2007	2008	2009	2010	2011	Mean
World	1.54	1.56	1.30	0.92	0.94	1.32	1.59	1.31
United States	6.00	6.31	4.94	4.09	3.35	4.84	6.02	5.08
India	7.09	11.84	12.68	3.72	12.40	14.91	11.21	10.55
Australia	3.84	3.61	2.22	1.60	1.96	3.60	7.59	3.49
Uzbekistan	77.14	71.45	70.35	61.47	40.31	62.65	46.88	61.46
Brazil	1.46	0.98	1.18	1.26	1.29	1.32	2.00	1.36
China	0.11	0.20	0.19	0.14	0.15	0.19	0.24	0.17
Burkina Faso	76.40	79.10	79.19	78.02	68.26	61.22	55.38	71.08
Benin	64.46	31.72	39.57	32.35	23.43	16.36	20.65	32.65
Cameroon	22.04	17.23	16.21	7.46	9.21	7.23	10.30	12.81
Côte d'Ivoire	4.63	3.57	2.82	1.84	1.33	2.22	2.08	2.64
Chad	49.06	53.85	47.52	37.38	28.89	26.10	51.82	42.09
Mali	82.28	72.89	63.21	58.67	38.22	45.83	63.93	60.72

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