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Open-End Versus Ring Spun Cotton Yarns[1,2]

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The ICAC Secretariat developed a simple methodology to obtain estimates of the proportion of cotton yarns spun with each type of technology. The pillars of the analysis are: cotton production data from World Textile Demand, data on installed spinning capacity and annual shipments from the International Textile Manufacturers Federation (ITMF), and assumed productivity ratios of open-end rotors to spindles varying with the age of machinery.

There is an agreement among spinners that open-end rotors are between 4 to 8 times faster than spindles in the production of cotton yarn. However, given that open-end rotors spin coarser counts than spindles, the productivity ratio in terms of kilograms per hour is higher than the productivity ratio in terms of speed. Also, the older machinery is less productive than newer machinery. Unfortunately, no hard evidence is available on the productivity relationship between open-end rotors and spindles, so a particular number must be assumed to proceed with the analysis. The productivity ratio (in terms of kilograms per hour of operation) for open-end rotors compared to spindles of the same age is assumed to be 7.

In order to account for the fact that in most regions the median age of open-end rotors is lower than the median age of spindles, the productivity ratio is assumed to be 1 unit higher for every five years of difference between the ages of the machines. For example, open-end rotors are, on average, 8 years older than spindles in Africa (the median age of open-end rotors is 19 years and the median age of spindles is 27 years) and the productivity ratio is assumed to be 8. The median age of the machines is estimated as the number of years required to accumulate half the installed capacity in 2006 by adding up annual machinery shipments from 2006 backwards. It must be noted that calculating the median age of the machinery in this way results in open-end rotors being between 5 years old in China (Mainland) to 19 years old in Turkey and Africa, and spindles being between 10 years old in Turkey to more than 27 years old in South America and China (Mainland).

The methodology to estimate the proportion of cotton yarns spun with each type of technology involves 4 steps. The first three steps involve regional calculations and the last one a global calculation. The first step is to express total installed spinning capacity in spindle equivalents by adding installed spindle capacity and the product of installed rotor capacity and the productivity ratio. The second step is to estimate the share of rotor spinning capacity as the ratio of the product of installed rotor capacity and the productivity ratio to total installed spinning capacity in spindle equivalents. The third step is to calculate the share of cotton yarn rotor spun for each region, by multiplying the regional volume of yarn production by the regional share of rotor spinning capacity. The last step is to calculate the share of cotton yarn rotor spun at the world level as the weighted average of regional shares, the weights being the volume of regional cotton yarn production.

The share of yarn rotor spun at the world level is estimated to be around 20%, and the share of ring spun yarn is estimated at 80%. A similar relation is observed in Africa, and developed Asia and Oceania, and China (Mainland), while in South America rotor spun yarn accounts for about 30% of all cotton yarn and ring spun yarn represents about 70%. In North America, West Europe, and Turkey, rotor spun yarn represents about 40% of all cotton yarns, and ring spun yarn represents about 60%. In Eastern Europe, the pattern is reversed, and rotor spun yarn represents about 76% of all cotton yarns, and ring spun represents about 24%.

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[1] Extract from ICAC's *World Textile Demand*, September 2009, available at www.icac.org.
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Table 1. Regional and World Share of Yarn Rotor and Ring Spun

Region	Installed Capacity (thousand)		Median Age of the Machinery (years)		Productivity Ratio	Share of Yarn Spun (%)	
	Rotors	Spindles	Rotors	Spindles	Rotor to Spindle	Rotor Spun	Ring Spun
Africa	208	6490	19	27	8	20	80
N. America	543	6157	10	25	9	44	56
S. America	451	9272	12	>27	9	30	70
Asia & Oceania	3539	165629	10	26	9	16	84
West Europe	305	3673	10	14	7	37	63
East Europe	2352	5258	19	21	7	76	24
Turkey	577	6500	10	10	7	38	62
World	7975	202979				20	80
China (Mainland)	1840	89000	5	>27	10	17	83

Sources: author's calculations based on ICAC and ITMF data.