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Changes in Average Garment Weight & End-Use Demand

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Introduction

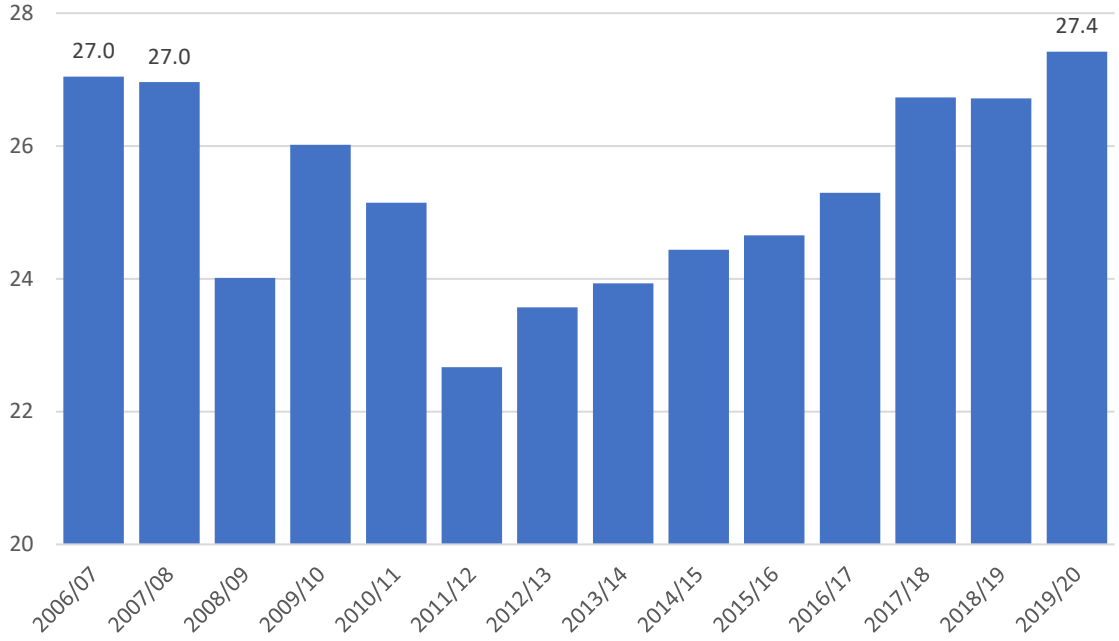
The global cotton market has experienced a series of demand shocks over the past couple decades. Well documented examples include the financial crisis in 2008/09 and the price spike in 2010/11. Both have had lingering consequences. Slower global economic growth since the world recession has impeded growth in consumer demand for apparel and textiles. The decrease in cotton's share that followed the spike has not been recovered. In combination, these two factors were contributors to what has been a lost decade for global cotton demand. Only in the coming crop year (2019/20) is world mill-use expected to surpass the peak set in 2006/07 (Chart 1).

Nonetheless, the financial crisis and the price spike are not the only demand-related shocks experienced over the past 20 years. A less frequently discussed, but equally important development for fiber demand was the decline in average garment weights. A general approximation for cotton end-use suggests that 80% of cotton fiber is destined for apparel (15% for home furnishings and 5% for non-wovens). Consequently, a shift in average apparel weight can have a significant impact on global mill-use.

This article presents data collected from three of the world's largest apparel importers (U.S., E.U., and Japan) and describes how all three markets experienced a significant decrease in garment weight over the past two decades. With each location having faced a double-digit decrease in average product weight, the phenomenon appears to have been both severe and global. Evidence from the U.S. suggests that the effect on end-use demand was greater than the effect of the loss in cotton's share.

A positive for demand, however, is that apparel weights stabilized in all three markets by 2014. This indicates that the headwind posed to consumption growth stemming from the lightening of garments has abated. In the U.S. and Japan, a gentle upward trend in average weight has emerged, hinting that a gentle tailwind may have developed. Along with the stabilization in share, the maintenance or increase in average product weight could help lift global cotton consumption to the record currently forecast in 2019/20 and to new records further into the future.

Chart 1. Global Cotton Consumption (million tons)



Source: USDA

Import Data

Over the past decade and a half, with the tightening of silhouettes, the rise of fast fashion, and the emergence of athleisure, there has been discussion regarding the lightening of garments and possible effects on cotton consumption. Defining and quantifying the effects of these trends on garment weight was a challenge, and discussion was initially anecdotal.

To address the impact of changes in garment weight on cotton consumption, a more formal approach to address questions related to average product weight was developed. This approach was based on trade data (Devine, 2014, 2015, 2016, 2017). To understand these methods, it is necessary to have a basic understanding of how global trade data are tracked.

Most countries around the world implement the Harmonized System (HS) for the classification of internationally traded goods. This system is hierarchical, with codes identifying product becoming increasingly precise with additional digits. As an example, one of the broadest sets of aggregations is referred to as chapters that are identified by two digits (e.g., Chapter 61 for knit apparel and Chapter 62 for woven apparel). Underneath chapters, there are four-digit, six-digit, and even more precise sets of codes.

Countries that have adopted the HS agreed to standardize import codes and classifications through the six-digit level. Beyond the six-digit level of precision, countries can further delineate product categories as they choose. In the U.S., import classification extends to ten digits. In Japan, import classification extends to nine digits. For the E.U., it extends to eight.

An important result of the HS is that by standardizing product definitions, it allows trade flows to be tracked and compared. For each shipment of apparel, three data attributes are commonly recorded. These attributes are value, item count, and shipment weight. Most countries publish these attributes for each HS code on government websites each month.

Investigating Product Weight

With attributes for weight and count, a researcher interested in investigating changes in product weight can simply download these figures and divide weight by count. This derivation generates averages that can be compared over time. Cotton Incorporated has done this for imports into the U.S., the E.U., and Japan.

To illustrate how average product weights can be derived for individual categories, three examples are presented in Table 1. These include t-shirts (both genders) and woven pants (by gender). The time periods selected for comparison are 2007 (calendar year near the existing record in global mill-use) and 2018 (latest full year with data available).

The percentage change figures show that average weights decreased for each of the selected product categories for each importing country/region during this time. The magnitude of the decline varied, but the change in average weight for these popular categories was commonly between 10-15%. For each of these markets, knit shirts represent between 30-40% of cotton-dominant apparel import weight and woven bottoms represent between 20-30% of total cotton-dominant weight (Devine, 2017). With t-shirts and woven bottoms representing such large proportions of end-use consumption of apparel, these decreases in average product weight had an effect on global demand.

Table 1. Average Product Weight for Select HS6 Codes for the U.S., the E.U., and Japan 2007 & 2018

Product	Country	2007 Average Weight	2018 Average Weight	Percent Change
T-Shirts, All Genders (HS 610910)	U.S.	0.17	0.16	-5.6%
	E.U.	0.18	0.15	-12.8%
	Japan	0.15	0.15	-1.1%
Men's & Boys' Woven Bottoms (HS 620342)	U.S.	0.57	0.49	-14.0%
	E.U.	0.54	0.47	-11.9%
	Japan	0.53	0.43	-19.4%
Women's & Girls' Woven Bottoms (HS 620462)	U.S.	0.43	0.38	-10.9%
	E.U.	0.42	0.39	-8.0%
	Japan	0.42	0.36	-15.1%

Notes: HS 610910 is defined as "knit t-shirts, singlets, tank tops and similar garments, knitted or crocheted: of cotton." HS 620342 is defined as "men's and boys' woven trousers, bib and brace overalls, breeches, and shorts: of cotton." HS 620462 is defined as "women's and girls' woven trousers, bib and brace overalls, breeches and shorts: of cotton". "Of cotton" indicates that the product is 50% or more cotton content by weight (cotton-dominant). Data from respective country/regional statistical agencies.

To examine changes in product weight more generally, it is possible to sum across categories. The import databases were built from the most granular categories for each country/region. To get the most general perspective, covering all apparel, sums were created that spanned HS Chapters 61 and 62 (knit

and woven apparel). As with individual products, the sums of weight can be divided by the sums of counts to derive measures of average product weights. [1]

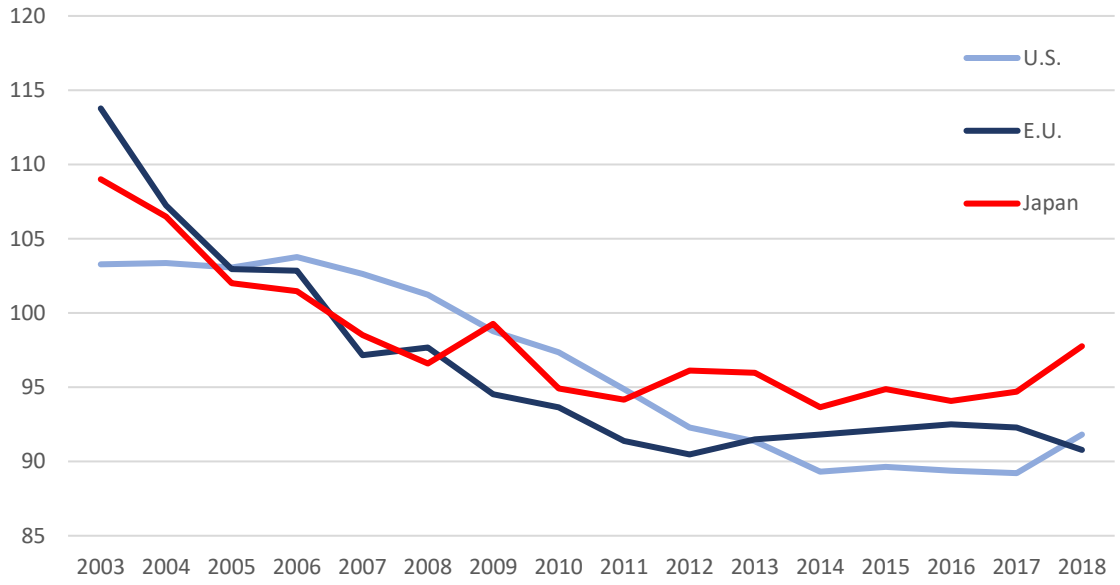
Chart 2 shows the aggregate results for the sums of all categories included under HS Chapters 61 and 62. All of the values are indexed to emphasize the change in aggregate product weight relative to the average between 2006-07 (two calendar years surrounding the crop year of peak mill-use). Changes in index values should be interpreted as percentage change. For example, these decrease in index values for the E.U. from a level near 115 in 2003 to a level near 90 in 2012 indicates a change of 25 percent.

Each of the trend lines show decreases in product weight. However, the timing of the decreases varied by importer. The declines in average product weights in the E.U. and Japan started in the early 2000s, before the decreases in the U.S., which started after 2006. The magnitudes of the decreases were large and relatively similar, with product weights in each country/region dropping 15% to 25%.

For context, the loss in cotton's share of U.S. apparel following the 2010/11 price spike was about ten percentage points, from levels near 60% prior to the spike to those near 50% more recently (USDA Economic Research Service). Meanwhile, the decline in average product weight for the U.S. was near 15% (index values decreased from a level near 105 in 2006 to those near 90 by 2013). Correspondingly, the effect on demand from the decrease in weight was more consequential than the decrease in share.

[1] These indexes are simply the sum of weight over the sum of counts. As a result, they incorporate changes across products (e.g., moving from jeans to stretch knit pants). Alternate indexes were also developed that fixed product shares (e.g., jeans share fixed at 12%), thereby allowing description of changes in product weight without allowing for shifts across categories (Devine, 2016). These alternate indexes are available from the author.

Chart 2. Change in Average Garment Weight in the U.S., the E.U., and Japan 2004-18 (apparel of all fibers, 2006-07=100)



Notes: Data are for all fibers. Parallel indexes have been derived for cotton-dominant and man-made-fiber-dominant apparel (contact the author if interested). Those indexes show decreases of similar magnitude over the same time frame. Figures are Cotton Incorporated calculations based on import data published by respective country/regional statistical agencies.

Potential Causes

A variety of factors were likely behind the decreases in product weight. Some may have arisen from fashion and some may have arisen from new technical abilities. The refinement and increased use of filament in apparel over the past two decades may have helped push garment weights lower. While this applies directly to clothing with man-made fiber content, for cotton, improved seed technologies and the continued progression towards longer staple lengths has enabled more widespread use of finer yarns and therefore a greater ability to make lighter weight fabric/garments.

Among the influential fashion trends, one was the athleisure movement. With an emphasis on keeping wearers cool, this would have pushed manufacturers towards lighter fabrics. Another development was a change in silhouettes, with tighter fitting garments like skinny jeans requiring less fabric than traditional or baggy styles. There was also the rise of fast fashion. With fast fashion's emphasis on delivering the latest styles at a low price, it has been associated with a decreased emphasis on quality which could imply the use of lighter fabrics and less fiber.

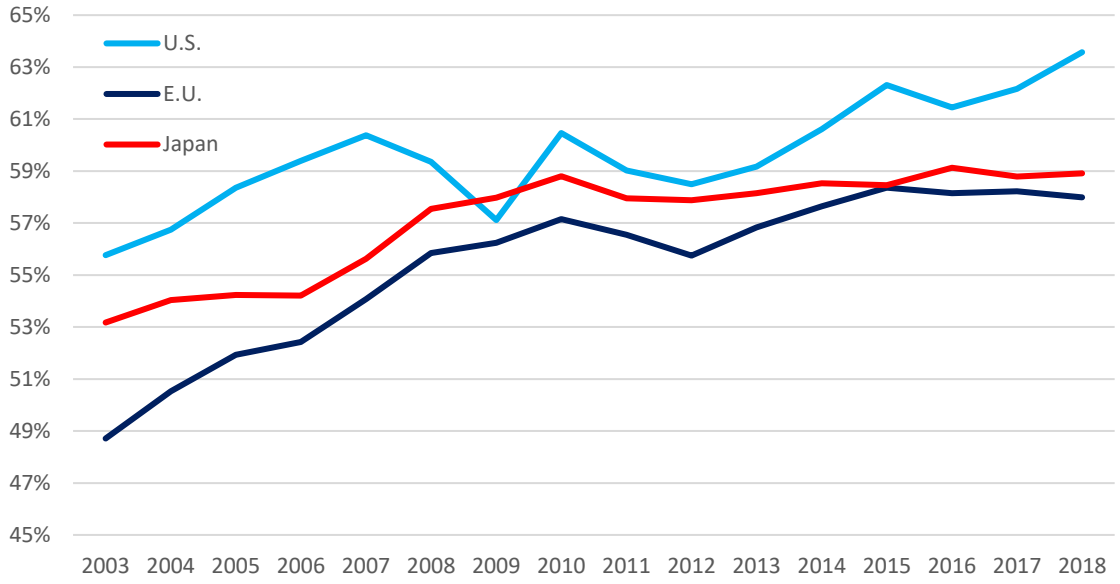
In reality, it was likely not a single cause, but rather a confluence of these factors that led to the lightening of garments. The difficulty in securing representative data to quantify fashion trends or technological change makes it difficult to delineate the relative influence of contributing factors. Nonetheless, trade data can once again be leveraged to gain some insight.

The data presented in Chart 3 show knit apparel's share of total garment imports for the U.S., the E.U., and Japan. For all three markets, there has been a definite upward trend in the share of knitwear over the past 20 years. This could be a reflection of yet another fashion trend, notably the longer-term shift towards increasingly casual clothing. It also could be related to the rise of athleisure.

The available sample size (n=16 from 2003 to 2018) is small and that limits interpretability. That stated, the correlations between knitwear's share and product weight were strong for both the E.U. (-95%) and Japan (-90%). For U.S., the correlation was weaker, but still suggests a relationship (-66%) between knit's share of apparel and average product weight.[2]

[2] A negative correlation should be expected, with a rise in the share of knits versus wovens associated with lighter garments.

Chart 3. Knit Share of Total Imported Apparel Weight



Notes: Data are for all fibers. Parallel data can be pulled for cotton-dominant and man-made-fiber-dominant apparel (contact author). Figures are Cotton Incorporated calculations based on import data published by respective country/regional statistical agencies.

Conclusions

The global cotton market has experienced multiple demand-related shocks over the past two decades. While the economic slowdown and the loss in share are commonly cited, the decrease in average garment weight that occurred over the past 20 years has also had a significant effect and should not be forgotten in analyses of cotton demand. With evidence of double-digit declines in garment weight collected from each of the world's largest apparel importers, this has been a global phenomenon and likely was repeated in other major consumer markets (e.g., China and India).

While the decrease in garment weight was a headwind for consumption growth in the past, the more recent stabilization and gentle increases in average weight may emerge as a positive for cotton demand in the future.

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