TRACKING COTTON END-USE ACROSS MAJOR APPAREL IMPORT MARKETS

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Abstract

Even with an upward trend in global mill-use over the past five years, world cotton consumption remains about 10% below its peak in the mid-2000s. Mill demand is ultimately a reflection of order placement from retailer and brands and therefore is also reflected in end-use consumption. The majority of cotton end-use is in apparel (near 80% for the U.S.). Considering that the majority of the cotton fiber consumed by mills is destined to go into apparel, tracking what is happening in apparel markets is critical for understanding what is happening relative to fiber demand. While there has been a considerable amount of research devoted to end-use in the U.S. due to the dominance of apparel imports in the U.S. market and the availability of U.S. apparel import data, comparatively little is known about other major apparel importing countries and regions, with notable exceptions being Japan and the European Union (E.U.). To better understand the dynamics of these other major apparel import markets, a database covering a common set of apparel products was developed. The purpose of this research is to describe developments in these major apparel import markets. Findings are descriptive in nature and discussion covers changes in sourcing patterns relative to country of origin as well as product category.

Introduction

The world cotton market experienced a series of demand-side shocks in recent years. The first of these was the global recession of 2008/09, which caused consumers around the world to constrain spending and become more value-focused. In turn, the reduction in consumer spending caused retailers to pull back on order volumes and to look deeper into possibilities for lowering sourcing costs. The second shock was specific to the cotton supply chain and originated from the spike in fiber prices that occurred in 2010/11. The spike caused a loss in market share relative to competing fibers, notably polyester, but also could be seen as amplifying the drive by retailers' to lower sourcing costs that originated with the recession.

In combination, these two shocks can be seen as principal causes of the weakness in cotton demand in recent years. The 2016/17 crop year is eight years after the global recession and six years after the spike in cotton prices. Despite the growth in the global economy since the recession, and despite the declines in cotton prices that have occurred since 2010/11, global mill-use in 2016/17 is forecast (111.8 million bales according to the USDA's January forecast) to hold to levels about 10% below the peak enjoyed in 2006/07 and 2007/08 (average mill-use of 124.0 million bales).

The U.S. is one of the world's largest end-users of cotton. Examination of the raw fiber content of U.S. apparel imports identified a decline in the raw fiber bale equivalence of end-use consumption. Major contributors to the decline in import volume included not only a loss in cotton's share relative to competing fibers, bit also a decline in average product weight. In fact, the declines in average product weight have been estimated to have resulted in a larger decline in fiber usage that the reduction in share (Devine 2014; Devine 2015, Devine 2016).

While these dynamics have been identified and quantified in the U.S. market, parallel analyses have not been developed for other major apparel import markets. For that reason, a database examining patterns for apparel imports for Japan and the European Union have been developed. The focus of the discussion in this article is to describe trends in sourcing as it relates to raw fiber equivalence of apparel imports. Findings derived from descriptive statistics related to bale equivalence by country of origin, the relative importance of different product categories, cotton's share, and average product weight.

Data

In order to standardize import classification across countries, and therefore to simplify issues related to tariffs and data collection, many of the world's countries have adopted the Harmonized System (HS). The HS is maintained by the World Customs Organization (WCO), which has over 180 members that represent more than 98% of world trade.

For the classification of imports and exports, the HS is successive. This means that additional digits are added to product codes in order to describe additional category precision. For example, the most general HS codes contain only two digits (e.g., 61 for knit apparel, 62 for woven apparel) and are known as chapters. There are also four digit (HS4) and six digit classifications (HS6) maintained by the WCO. Countries following the WCO's parameters have uniform trade classification up to the HS6 level. Product specification beyond the HS6 level is possible. For example, the U.S. has product classification codes with as many as ten digits. However, precision beyond the HS6 level is not part of the WCO's set of standard codes and will vary from country to country.

The apparel import databases assembled for the U.S., Japan, and the E.U. contain figures describing the weight, count, and value for all 243 HS6 import categories that have existed since 2004 (there are updates, and both old and new codes are included this number). In addition, the data for each of these three attributes (weight, count, and value) are available by country of origin for every HS6 code. Data have been downloaded for home furnishings (HS chapter 63) as well, and although these data are in the databases they were not analyzed as part of this article.

Fortunately, there are many HS6 categories that involve fiber content. Fiber-related distinctions are drawn at the 50% level. With products having more than 50% content (by weight) classified as being dominantly that fiber. An example of a HS6 code that relates to fiber content is 611020, which represents men's and boy's cotton-dominant knit pullovers (shirts).

While certain HS6 codes identify the dominant fiber, there are others that do not. Among the 243 HS6 codes for apparel, there are only 78 that specify the dominant fiber (includes updates). While this represents a minority in terms of the code count, these codes represent the vast majority of apparel import volume. For the U.S., Japan, and the E.U., the 78 codes that specify fiber dominance account for 80-85% of the total import volume on a weight basis (percentages derived as a ratio of weight of products with fiber-dominance identified versus the weight of all codes – meaning codes that reference fiber and those that do not). Due to the fact that fiber-related information is not uniformly available across HS6 codes, it is not possible to speak about fiber content across all HS6 codes. Correspondingly, the data presented in this analysis is based on the 80-85% sample of the codes that define fiber content.

It is also noteworthy that discussion of fiber content is only possible according to fiber dominance. This introduces an important caveat for discussions of raw fiber equivalence and for share because any changes in blending levels within fiber-dominant categories cannot be identified. For example, a switch from a 100% cotton t-shirt to a 60/40 cotton/polyester t-shirt will not trigger a change in the HS6 category for cotton-dominant t-shirts (HS6 code 610910).

Despite limitations related to incomplete coverage of fiber content across the universe of apparel import categories and the lack of precision relative to fiber content among the categories that do identify the dominant fiber, there remains a lot information regarding dynamics in end-use consumption that can be derived from the examination of trends in apparel imports across markets.

Discussion of descriptive statistics derived from these databases is divided into three sections. The first examines changes in the weight of cotton-dominant imports relative to the weight of man-made-fiber-dominant (mmf-dominant) imports by country of origin. The second examines changes in the share of import weight by product category (i.e., the share of knit shirts relative to woven bottoms). A third section describes changes in derivatives from the three core data attributes. Specifically, the third section looks at changes in cotton-dominant share and changes in average product weight.

Changes in Apparel Import Weight

The data shown in Tables 1-4 describe the weight-based volume of cotton-dominant and mmf-dominant apparel imports for the U.S., the E.U., and Japan, as well as the sum of the imported weight for each of these markets. All of the figures have been converted to the equivalence of million 480lb bales. The years presented are 2007, which was the calendar year of peak mill-use and peak import weight for many of these markets, and 2015, which is the latest calendar year with data at the time this article was written. The lists of countries of origin were composed as a combination of a list of the world's largest apparel exporters (China, Bangladesh, Vietnam, India, Pakistan, Mexico, Indonesia, Turkey) as well as regional focus for smaller apparel exporters that are important to certain apparel import markets (e.g., western hemisphere countries for the U.S., southeastern Asian countries for Japan).

U.S.

For the U.S. (Table 1), we note that there was growth in cotton-dominant import volume from China, Bangladesh, and Vietnam. It is notable that cotton-dominant imports from China increased despite the very high prices for Chinese cotton relative to prices for Chinese polyester during the past several years. Outside of these three countries, which are the largest sources for cotton-dominant apparel, there were reductions for most other countries of origin with a few exceptions among the list of western hemisphere locations (i.e., Nicaragua and Haiti).

In contrast to cotton-dominant import volumes, virtually all of the most important countries of origin for mmf-dominant apparel increased their volume. In particular, there were large increases in mmf-dominant apparel exports from China and Vietnam. For each of the countries of origin with declines in mmf-dominant shipments, there were larger deceases for cotton-dominant imports. This implied very few locations with increases in cotton-dominant share since 2007.

Among the large shippers, only Bangladesh was able to manage an increase in cotton-dominant share and it was slight (+0.3 ppt). Across all countries of origin, cotton-dominant share was down 13.4 ppt. It is notable that the decline from China was smaller (-10.9 ppt) than the overall decline. Countries with declines in cotton-dominant share that exceeded the U.S. average were Vietnam as well as many countries in the western hemisphere.

E.U.

For the E.U. (Table 2), there was a substantial gain in cotton-dominant apparel import volume from Bangladesh (+1.5 million bales). The gain from Bangladesh was able to more than compensate for the decline from China (-1.3 million bales). However, there were sizeable decreases in cotton-dominant volume from other sources, including Turkey (-0.4 million bales) and Vietnam (-0.3 million).

Imports of mmf-dominant apparel were mostly higher, and all of the countries that had declines in mmf-dominant apparel exports to the E.U. had bigger declines for cotton-dominant apparel shipments.

In terms of cotton-dominant share, the decline suffered in the E.U. was only about half of the magnitude of the decline in the U.S. (-7.8 ppt and -13.4 ppt respectively).

Japan

Although China easily remains the most important sourcing location for Japan (Table 3), among the three apparel import markets there was also the clearest evidence of a move away from China as a sourcing destination by Japan. This was certainly true for cotton-dominant apparel, where volumes from China were down by more than a million bales and there were gains in cotton-dominant apparel imports for virtually all other locations.

On the mmf-dominant side, there was only a marginal increase in imports from China and virtually universal increases in imports from all other locations.

In terms of share, Bangladesh registered a strong gain (+11.9 ppt), but the overall decline was 14.5 ppt, which was the largest registered across the three apparel importers. This overall decrease in share was primarily driven by the decreases from China (-18.4 ppt) and Cambodia (-22.8 ppt).

Sum of U.S., E.U., and Japan

For the sum of the U.S., the E.U., and Japan (Table 4), the biggest decline in cotton-dominant apparel imports was from China. There were gains in mmf-dominant imports from all major sourcing locations except Mexico, but the decline in Mexico was a result of a contraction in apparel shipments from that country in general, with cotton-dominant's share of Mexican apparel exports also decreasing.

Among all of the largest countries of origin, Bangladesh is a strong point for cotton-dominant volume and cotton-dominant share with cotton-dominant volume up over four million bales and cotton-dominant share steady since 2007. Vietnam is a location with strong growth in apparel exports, but cotton-dominant garments have lost more share there than in any other apparel export country (-16.6 ppt). China remains dominant overall shipper of apparel, both cotton-dominant and mmf-dominant, and the loss of cotton-dominant volume and share from China is not helpful for end-use consumption of cotton across each of the three apparel import markets.

Table 1. Changes in U.S. Apparel Imports between 2007 and 2015 (ranked by 2015 cotton-dominant volume).

	Cotton-Dominant (480lb bales)			MMF-Dominant (480lb bales)			Cotton-Dominant Share		
	2007	2015	Change	2007	2015	Change	2007	2015	Change (ppt)
China	2,978,615	3,173,938	195,323	1,900,587	3,150,792	1,250,205	61.0%	50.2%	-10.9%
Bangladesh	946,883	1,227,405	280,521	189,039	239,123	50,084	83.4%	83.7%	0.3%
Vietnam	724,229	1,128,027	403,798	335,657	977,026	641,369	68.3%	53.6%	-14.7%
Mexico	1,241,022	773,029	-467,993	339,059	252,730	-86,328	78.5%	75.4%	-3.2%
Honduras	978,922	706,305	-272,617	284,464	448,213	163,749	77.5%	61.2%	-16.3%
Pakistan	769,411	542,913	-226,498	17,123	36,719	19,596	97.8%	93.7%	-4.2%
India	666,371	522,928	-143,443	48,523	109,723	61,199	93.2%	82.7%	-10.6%
Indonesia	593,126	513,838	-79,288	271,821	349,794	77,973	68.6%	59.5%	-9.1%
El Salvador	495,196	420,023	-75,173	140,193	183,714	43,521	77.9%	69.6%	-8.4%
Nicaragua	358,616	395,548	36,933	42,185	149,416	107,232	89.5%	72.6%	-16.9%
Haiti	247,470	302,187	54,717	85,427	58,635	-26,792	74.3%	83.7%	9.4%
Dominican Rep	205,932	178,951	-26,981	61,520	41,035	-20,486	77.0%	81.3%	4.3%
Guatemala	331,317	175,960	-155,357	94,081	116,372	22,291	77.9%	60.2%	-17.7%
Peru	105,843	49,837	-56,006	7,047	9,816	2,769	93.8%	83.5%	-10.2%
Turkey	75,082	34,557	-40,525	17,723	15,565	-2,158	80.9%	68.9%	-12.0%
Colombia	56,650	16,202	-40,448	15,913	6,685	-9,228	78.1%	70.8%	-7.3%
Canada	35,217	3,709	-31,508	26,452	11,598	-14,854	57.1%	24.2%	-32.9%
Brazil	9,088	388	-8,700	1,409	557	-852	86.6%	41.1%	-45.5%
Panama	1,147	215	-932	81	4	-77	93.4%	98.1%	4.7%
Ecuador	3,353	120	-3,233	264	50	-214	92.7%	70.6%	-22.1%
Costa Rica	144,215	56	-144,159	11,965	2,155	-9,810	92.3%	2.5%	-89.8%
Chile	179	14	-165	44	17	-28	80.2%	45.6%	-34.6%
Rest of World	3,296,905	1,221,654	-2,075,251	924,143	996,228	72,085	78.1%	55.1%	-23.0%
World	14,264,789	11,387,805	-2,876,983	4,814,722	7,155,968	2,341,246	74.8%	61.4%	-13.4%

Table 2. Changes in E.U. Apparel Imports between 2007 and 2015 (ranked by 2015 cotton-dominant volume).

	Cotton-Dominant (480lb bales)			MMF-Dominant (480 lb bales)			Cotton-Dominant Share		
	2007	2015	Change	2007	2015	Change	2007	2015	Change (ppt)
Bangladesh	1,955,164	3,485,188	1,530,023	457,116	788,064	330,947	81.1%	81.6%	0.5%
China	3,879,627	2,565,740	-1,313,886	2,340,623	3,095,592	754,969	62.4%	45.3%	-17.1%
Turkey	1,557,860	1,111,173	-446,688	347,476	564,733	217,257	81.8%	66.3%	-15.5%
India	913,816	813,389	-100,427	79,809	189,615	109,805	92.0%	81.1%	-10.9%
Pakistan	414,731	633,963	219,232	47,773	81,678	33,905	89.7%	88.6%	-1.1%
Cambodia	98,480	360,201	261,721	76,320	288,100	211,780	56.3%	55.6%	-0.8%
Morocco	296,239	230,003	-66,236	147,346	140,253	-7,093	66.8%	62.1%	-4.7%
Tunisia	250,304	166,040	-84,264	77,930	55,342	-22,587	76.3%	75.0%	-1.3%
Sri Lanka	170,249	148,890	-21,358	66,314	116,279	49,965	72.0%	56.1%	-15.8%
Vietnam	484,721	146,184	-338,537	274,425	292,935	18,509	63.9%	33.3%	-30.6%
Indonesia	210,731	120,798	-89,933	123,987	89,425	-34,562	63.0%	57.5%	-5.5%
Egypt	103,833	63,984	-39,849	14,455	20,655	6,200	87.8%	75.6%	-12.2%
Myanmar	29,779	37,804	8,025	26,479	54,779	28,300	52.9%	40.8%	-12.1%
Thailand	100,344	26,783	-73,561	91,442	37,131	-54,310	52.3%	41.9%	-10.4%
Mauritius	102,023	26,668	-75,355	3,946	9,790	5,844	96.3%	73.1%	-23.1%
United States	20,091	16,962	-3,129	6,516	12,320	5,805	75.5%	57.9%	-17.6%
Philippines	27,868	13,010	-14,857	27,101	14,764	-12,337	50.7%	46.8%	-3.9%
Mexico	4,618	6,597	1,979	3,035	2,254	-780	60.3%	74.5%	14.2%
Jordan	741	915	174	1,148	3,452	2,303	39.2%	21.0%	-18.3%
Rest of World	1,092,512	738,178	-354,334	706,469	526,230	-180,239	60.7%	58.4%	-2.3%
World	11,713,734	10,712,471	-1,001,263	4,919,720	6,383,406	1,463,685	70.4%	62.7%	-7.8%

Table 3. Changes in Japanese Apparel Imports between 2007 and 2015 (ranked by 2015 cotton-dominant volume).

	Cotton-Dominant (480lb bales)			MMF-Dominant (480lb bales)			Cotton-Dominant Share		
	2007	2015	Change	2007	2015	Change	2007	2015	Change (ppt)
China	1,985,627	974,239	-1,011,387	1,650,559	1,719,340	68,781	54.6%	36.2%	-18.4%
Vietnam	47,703	151,558	103,855	39,447	193,970	154,523	54.7%	43.9%	-10.9%
Bangladesh	4,300	110,925	106,625	3,139	48,163	45,023	57.8%	69.7%	11.9%
Cambodia	2,574	64,880	62,306	283	31,517	31,234	90.1%	67.3%	-22.8%
Indonesia	10,834	55,840	45,006	14,413	77,642	63,229	42.9%	41.8%	-1.1%
Thailand	23,404	26,862	3,459	14,319	24,447	10,128	62.0%	52.4%	-9.7%
India	14,820	22,153	7,334	1,377	3,328	1,951	91.5%	86.9%	-4.6%
Myanmar	2,458	21,172	18,714	14,728	61,512	46,784	14.3%	25.6%	11.3%
Pakistan	462	7,170	6,707	34	178	143	93.1%	97.6%	4.5%
Philippines	7,843	6,891	-952	3,732	9,292	5,560	67.8%	42.6%	-25.2%
Turkey	1,843	5,325	3,483	245	2,691	2,446	88.3%	66.4%	-21.8%
Sri Lanka	1,707	5,082	3,375	77	628	551	95.7%	89.0%	-6.7%
South Korea	13,578	4,037	-9,541	27,707	25,089	-2,619	32.9%	13.9%	-19.0%
Italy	4,357	2,945	-1,413	2,078	1,607	-471	67.7%	64.7%	-3.0%
Mexico	1,255	1,336	80	313	362	49	80.1%	78.7%	-1.4%
Laos	189	669	481	288	2,270	1,981	39.6%	22.8%	-16.8%
Rest of World	23,669	26,381	2,712	10,673	14,293	3,619	68.9%	64.9%	-4.1%
World	2,146,623	1,487,466	-659,157	1,783,413	2,216,328	432,915	54.6%	40.2%	-14.5%

Table 4. Changes in Sum of U.S., E.U., and Japanese Apparel Imports between 2007 and 2015 (ranked by 2015 cotton-dominant volume).

	Cotton-Dominant (480lb bales)			MMF-Dominant (480lb bales)			Cotton-Dominant Share		
	2007	2015	Change	2007	2015	Change	2007	2015	Change (ppt)
China	8,843,869	6,713,918	-2,129,951	5,891,769	7,965,724	2,073,955	60.0%	45.7%	-14.3%
Bangladesh	2,906,348	4,823,517	1,917,169	649,295	1,075,350	426,055	81.7%	81.8%	0.0%
Vietnam	1,256,653	1,425,769	169,116	649,529	1,463,931	814,402	65.9%	49.3%	-16.6%
India	1,595,006	1,358,469	-236,537	129,710	302,666	172,955	92.5%	81.8%	-10.7%
Pakistan	1,184,604	1,184,045	-558	64,931	118,574	53,643	94.8%	90.9%	-3.9%
Turkey	1,634,784	1,151,055	-483,729	365,444	582,990	217,546	81.7%	66.4%	-15.4%
Mexico	1,246,895	780,961	-465,933	342,406	255,347	-87,059	78.5%	75.4%	-3.1%
Indonesia	814,691	690,476	-124,215	410,221	516,861	106,640	66.5%	57.2%	-9.3%
Rest of World	8,642,295	5,459,530	-3,182,765	3,014,551	3,474,260	459,709	74.1%	61.1%	-13.0%
World	28,125,145	23,587,742	-4,537,404	11,517,855	15,755,702	4,237,846	70.9%	60.0%	-11.0%

Product Share

In addition to being able to describe changes that have occurred in sourcing by country of origin, the apparel import databases also enable discussion of changes according to product category. Many of the largest product categories for apparel are among the set of 78 HS6 codes that delineate according to fiber content. All of these 78 codes can be paired, so that cotton-dominant apparel product categories can be contrasted against mmf-dominant apparel product categories. These pairings were aggregated to create the general product categories show in Tables 5-8 relative importance of cotton-dominant and mmf-dominant apparel product categories are presented in this section.

U.S.

For the U.S. (Table 5), the most important product category on a weight basis is knit shirts. The relative importance of knit shirts is slightly greater for cotton-dominant garments (37% in 2015) than it is for mmf-dominant garments (33% in 2015).

After knit shirts, the most important category is woven bottoms, but there was a sharp difference for importance of cotton-dominant volumes (28%) relative to mmf-dominant volumes (8%). Previous analysis of the U.S. apparel import market found that denim jeans represented slightly less than half of this volume and accounted for about 12% of total cotton import weight (Devine, 2015).

Each of the other product categories represented less than 10% of the total import weight for cotton-dominant products. For mmf-dominant apparel imports, knit bottoms represented 10%, coats represented 12%, and dresses and skirts represented 12%.

Product share was mostly stable across the past ten years. The one category that registered growth for both cotton-dominant and mmf-dominant apparel was knit bottoms (from 3-4% of cotton-dominant apparel in 2005 and 2010 to 6% in 2015, from 8% of mmf-dominant apparel in 2005 and 2010 to 10% in 2015). However, knit bottoms continues to account for only 8% of total apparel import weight (sum of cotton-dominant and mmf-dominant). Socks and dresses and skirts also registered slight growth, most of it coming from increases in mmf-dominant volume. The growth in these categories came at the expense of erosion in the product share for knit shirts and woven bottoms, with the most significant decreases occurring in mmf-dominant woven bottoms (from 16% to 8%).

E.U.

For the E.U. (Table 6), the most important product category is also knit shirts, followed by woven bottoms. Relative to the U.S., the largest difference among product share was for mmf-dominant coats, which account for 20% of mmf-dominant import weight in the E.U. versus only 12% for the U.S. The larger proportion for mmf-dominant coats was also a result of diminished importance of dresses and skirts (10% for E.U., 12% for U.S.) and knit bottoms (7% for E.U., 10% for U.S.).

Similar to the U.S., there has been growth in the importance of knit bottoms in the E.U. (from 3% in 2005 to 7% in 2015), but unlike the U.S. that was the only notable change in product proportions for cotton-dominant plus mmf-dominant share. For cotton-dominant apparel, there was slight growth in the share of woven bottoms (from 26% to 28%) and knit bottoms (from 3% to 7%). For mmf-dominant apparel, there were gains in share in knit bottoms (from 3% to 7%) and dresses and skirts (from 5% to 10%). These gains came at the expense of woven bottoms (from 13% to 9%) and coats (from 24% to 20%).

Japan

For Japan (Table 7), knit shirts and woven bottoms are the most important product categories. There has been a notable shift in the importance of knit shirts according to dominant fiber. The proportion of cotton-dominant apparel represented by knit shirts has fallen from 39% in 2005 to 33% in 2015. The proportion of mmf-dominant apparel represented by knit shirts has risen from 30% in 2005 to 38% in 2015. For the sum of cotton-dominant and mmf-dominant apparel, the proportion has held steady near 36%, indicating an important shift in fiber content for knit shirts in the Japanese market.

Among cotton-dominant categories, woven shirts were more important to the Japanese market (11%) than they were for the U.S. or the E.U. (6%). Mmf-dominant coats represented 12% of mmf-dominant volume, which is identical to the U.S. and lower than the E.U. (20%).

There was growth in Japanese knit bottoms, but that growth was not as notable as it was in the U.S. or the E.U.

Sum of U.S., E.U., and Japan

For the sum of the U.S., E.U., and Japan (Table 8), there was general stability in figures representing the combination of cotton-dominant and mmf-dominant apparel for both the bale volume and product share for most the product categories. There was a reduction in woven apparel and an increase in knit bottoms, but most of the other numbers changed only slightly.

While the identification of these product-level shifts is important, it is also important to remember that ten years have passed over the time period reflected in the Table 8. With the total fiber weight of apparel imports relatively unchanged over the past ten years, there has been relatively little growth in raw fiber demand over the past ten years. Previous research on the U.S. market has found that garments in the U.S. have become lighter over the past decade and has determined that this has been an important factor constraining end-use fiber consumption in the U.S. (Devine 2014; Devine 2015; Devine 2016). The next section explores the role that declining average product weight may have had in constraining end-use fiber consumption in other markets.

Another feature of the data shown in Table 8 is that there were declines in many cotton-dominant categories and gains in many mmf-dominant categories. The trend toward man-made fibers and away from cotton in apparel around the world is another factor affecting demand for raw cotton fiber. The loss in cotton-dominant share for each of these markets is also presented in the following section.

Table 5. Product Category Share of Cotton-Dominant Apparel Imports for the U.S. (data sorted on 2015 cotton-dominant volume).

	Cotton-Dominant			MMF-Dominant			Sum of Cotton & MMF		
	2005	**2010**	**2015**	**2005**	**2010**	**2015**	**2005**	**2010**	**2015**
Knit Shirts	5.02 (38%)	5.01 (37%)	4.17 (37%)	1.42 (30%)	1.42 (29%)	2.37 (33%)	6.43 (36%)	6.42 (35%)	6.54 (35%)
Woven Bottoms	3.91 (29%)	3.81 (28%)	3.21 (28%)	0.74 (16%)	0.59 (12%)	0.59 (8%)	4.65 (26%)	4.40 (24%)	3.80 (21%)
Woven Shirts	0.83 (6%)	0.83 (6%)	0.71 (6%)	0.37 (8%)	0.24 (5%)	0.33 (5%)	1.20 (7%)	1.06 (6%)	1.03 (6%)
Knit Bottoms	0.45 (3%)	0.60 (4%)	0.70 (6%)	0.38 (8%)	0.40 (8%)	0.70 (10%)	0.83 (5%)	1.00 (5%)	1.40 (8%)
Underwear	0.64 (5%)	0.60 (4%)	0.56 (5%)	0.13 (3%)	0.14 (3%)	0.20 (3%)	0.77 (4%)	0.74 (4%)	0.76 (4%)
Coats	0.54 (4%)	0.69 (5%)	0.44 (4%)	0.76 (16%)	0.75 (15%)	0.86 (12%)	1.30 (7%)	1.44 (8%)	1.29 (7%)
Socks	0.35 (3%)	0.51 (4%)	0.38 (3%)	0.19 (4%)	0.26 (5%)	0.51 (7%)	0.54 (3%)	0.77 (4%)	0.89 (5%)
Nightwear	0.48 (4%)	0.40 (3%)	0.34 (3%)	0.24 (5%)	0.29 (6%)	0.40 (6%)	0.72 (4%)	0.69 (4%)	0.74 (4%)
Dresses & Skirts	0.35 (3%)	0.37 (3%)	0.24 (2%)	0.24 (5%)	0.51 (10%)	0.82 (12%)	0.59 (3%)	0.88 (5%)	1.07 (6%)
Other	0.74 (6%)	0.74 (5%)	0.64 (6%)	0.24 (5%)	0.33 (7%)	0.38 (5%)	0.98 (5%)	1.07 (6%)	1.02 (6%)

Table 6. Product Category Share of Cotton-Dominant Apparel Imports for the E.U. (data sorted on 2015 cotton-dominant volume).

	Cotton-Dominant			MMF-Dominant			Sum of Cotton & MMF		
	2005	**2010**	**2015**	**2005**	**2010**	**2015**	**2005**	**2010**	**2015**
Knit Shirts	3.57 (36%)	4.21 (36%)	3.60 (34%)	1.64 (34%)	1.82 (35%)	2.26 (35%)	5.22 (35%)	6.02 (36%)	5.87 (34%)
Woven Bottoms	2.64 (26%)	2.98 (25%)	2.96 (28%)	0.64 (13%)	0.56 (11%)	0.57 (9%)	3.28 (22%)	3.54 (21%)	3.53 (21%)
Knit Bottoms	0.28 (3%)	0.57 (5%)	0.76 (7%)	0.16 (3%)	0.24 (5%)	0.42 (7%)	0.44 (3%)	0.81 (5%)	1.18 (7%)
Woven Shirts	0.64 (6%)	0.84 (7%)	0.68 (6%)	0.32 (7%)	0.24 (5%)	0.45 (7%)	0.96 (6%)	1.09 (6%)	1.13 (7%)
Socks	0.44 (4%)	0.56 (5%)	0.56 (5%)	0.06 (1%)	0.14 (3%)	0.14 (2%)	0.50 (3%)	0.70 (4%)	0.70 (4%)
Underwear	0.54 (5%)	0.54 (5%)	0.52 (5%)	0.18 (4%)	0.21 (4%)	0.17 (3%)	0.72 (5%)	0.74 (4%)	0.69 (4%)
Nightwear	0.52 (5%)	0.52 (4%)	0.40 (4%)	0.20 (4%)	0.18 (4%)	0.18 (3%)	0.72 (5%)	0.70 (4%)	0.58 (3%)
Coats	0.45 (5%)	0.45 (4%)	0.35 (3%)	1.17 (24%)	1.07 (21%)	1.29 (20%)	1.63 (11%)	1.52 (9%)	1.64 (10%)
Dresses & Skirts	0.36 (4%)	0.44 (4%)	0.29 (3%)	0.23 (5%)	0.46 (9%)	0.63 (10%)	0.59 (4%)	0.90 (5%)	0.93 (5%)
Other	0.56 (6%)	0.66 (6%)	0.58 (5%)	0.19 (4%)	0.23 (4%)	0.26 (4%)	0.75 (5%)	0.88 (5%)	0.85 (5%)

Table 7. Product Category Share of Cotton-Dominant Apparel Imports for Japan (data sorted on 2015 cotton-dominant volume).

	Cotton-Dominant			MMF-Dominant			Sum of Cotton & MMF		
	2005	**2010**	**2015**	**2005**	**2010**	**2015**	**2005**	**2010**	**2015**
Knit Shirts	0.87 (39%)	0.66 (35%)	0.49 (33%)	0.46 (30%)	0.73 (38%)	0.85 (38%)	1.33 (35%)	1.39 (37%)	1.34 (36%)
Woven Bottoms	0.45 (20%)	0.4 (21%)	0.34 (23%)	0.19 (12%)	0.17 (9%)	0.21 (10%)	0.64 (17%)	0.56 (15%)	0.56 (15%)
Woven Shirts	0.18 (8%)	0.16 (9%)	0.16 (11%)	0.10 (7%)	0.10 (5%)	0.10 (5%)	0.28 (8%)	0.26 (7%)	0.27 (7%)
Underwear	0.15 (7%)	0.13 (7%)	0.09 (6%)	0.03 (2%)	0.05 (3%)	0.06 (3%)	0.19 (5%)	0.18 (5%)	0.15 (4%)
Knit Bottoms	0.06 (3%)	0.07 (4%)	0.08 (5%)	0.09 (6%)	0.11 (6%)	0.15 (7%)	0.15 (4%)	0.18 (5%)	0.22 (6%)
Dresses & Skirts	0.07 (3%)	0.09 (5%)	0.07 (5%)	0.06 (4%)	0.13 (7%)	0.15 (7%)	0.13 (3%)	0.23 (6%)	0.23 (6%)
Socks	0.12 (5%)	0.11 (6%)	0.07 (4%)	0.08 (5%)	0.12 (6%)	0.15 (7%)	0.20 (5%)	0.23 (6%)	0.22 (6%)
Nightwear	0.14 (6%)	0.09 (5%)	0.04 (3%)	0.07 (4%)	0.08 (4%)	0.09 (4%)	0.21 (6%)	0.17 (4%)	0.13 (4%)
Coats	0.07 (3%)	0.05 (3%)	0.04 (3%)	0.25 (16%)	0.23 (12%)	0.27 (12%)	0.32 (8%)	0.28 (7%)	0.31 (8%)
Other	0.12 (5%)	0.13 (7%)	0.09 (6%)	0.22 (14%)	0.19 (10%)	0.18 (8%)	0.34 (9%)	0.32 (8%)	0.27 (7%)

Table 8. Product Category Share of Cotton-Dominant Apparel Imports for Sum of U.S., E.U., and Japan (data sorted on 2015 cotton-dominant volume).

	Cotton-Dominant			MMF-Dominant			Sum of Cotton & MMF		
	2005	**2010**	**2015**	**2005**	**2010**	**2015**	**2005**	**2010**	**2015**
Knit Shirts	9.46 (37%)	9.88 (36%)	8.27 (35%)	3.52 (32%)	3.96 (33%)	5.49 (35%)	12.98 (35%)	13.84 (35%)	13.75 (35%)
Woven Bottoms	7.00 (27%)	7.19 (26%)	6.52 (28%)	1.58 (14%)	1.32 (11%)	1.37 (9%)	8.57 (23%)	8.51 (22%)	7.89 (20%)
Woven Shirts	1.66 (6%)	1.84 (7%)	1.55 (7%)	0.79 (7%)	0.58 (5%)	0.88 (6%)	2.45 (7%)	2.41 (6%)	2.43 (6%)
Knit Bottoms	0.79 (3%)	1.24 (5%)	1.54 (7%)	0.63 (6%)	0.74 (6%)	1.26 (8%)	1.42 (4%)	1.99 (5%)	2.80 (7%)
Underwear	1.34 (5%)	1.27 (5%)	1.17 (5%)	0.34 (3%)	0.39 (3%)	0.43 (3%)	1.67 (5%)	1.67 (4%)	1.60 (4%)
Coats	1.07 (4%)	1.19 (4%)	0.84 (4%)	2.18 (20%)	2.05 (17%)	2.41 (15%)	3.25 (9%)	3.24 (8%)	3.25 (8%)
Socks	0.91 (4%)	1.17 (4%)	1.00 (4%)	0.33 (3%)	0.52 (4%)	0.81 (5%)	1.25 (3%)	1.69 (4%)	1.81 (5%)
Nightwear	1.14 (4%)	1.00 (4%)	0.79 (3%)	0.51 (5%)	0.56 (5%)	0.66 (4%)	1.65 (5%)	1.56 (4%)	1.45 (4%)
Dresses & Skirts	0.79 (3%)	0.90 (3%)	0.61 (3%)	0.52 (5%)	1.11 (9%)	1.61 (10%)	1.31 (4%)	2.01 (5%)	2.22 (6%)
Other	1.42 (6%)	1.53 (6%)	1.31 (6%)	0.65 (6%)	0.74 (6%)	0.83 (5%)	2.07 (6%)	2.27 (6%)	2.14 (5%)

Change in Cotton-Dominant Share and Average Product Weight

There are limitations to the data collected in the databases for the U.S., the E.U., and Japan. One of these includes the fact that only 80-85% of the total apparel import weight can be classified according to dominant fiber. Another is that fiber-dominance does not allow for the measurement of changes in blend levels within the 50% dominant windows. Nonetheless, it is possible to develop insight into change in cotton's share by looking at the data available.

Figure 1 shows data describing cotton-dominant weight relative to the sum of cotton-dominant and mmf-dominant apparel for the U.S., the E.U., and Japan. When looking at these data, it appears that the shifts in cotton share in both the U.S. and the E.U. have been somewhat similar. The U.S. started from a higher level and descended a little further. Losses in the E.U. were shallower, but started from a lower level. Cotton-dominant share for the products covered by the databases for both U.S. and the E.U. is currently around 63%.

Despite a lower starting point relative to the U.S. and the E.U., the loss in cotton-dominant share was also deeper. From a global perspective, the twenty point decline in the Japanese market is concerning if Japan can be considered as a trend setter for the Asian region, where the majority of the world's population is located and where economic growth is concentrated.

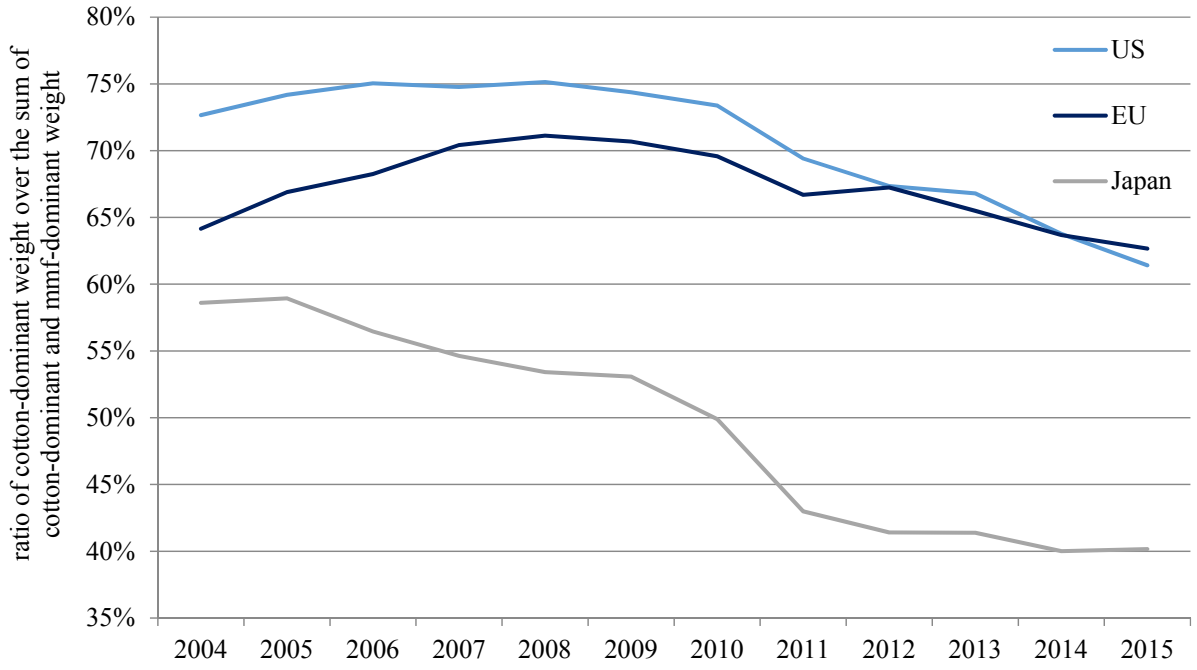

Figure 1. Change in Cotton-Dominant Share in Apparel Imports for the U.S., E.U., and Japan.

With the import databases, it is also possible to examine changes in average product weight. The data shown in Figure 2 indicate how the ratio of the total weight of all products (not just those that indicate the dominant fiber) over the total count of all products. The resulting data show that there was a universal decline in average garment weight over the past decade. The declines in the E.U. and Japan began earlier than they did in the U.S., but the magnitude of the reduction since 2004 was about 15 percentage points in each market over that time period.

A fifteen percentage point decline is not trivial. The decline in global mill-use since the 2007/08 peak was about 10%, so with evidence that apparel products have been getting lighter around world, it is possible to explain much of the decline from the lightening of garments alone.

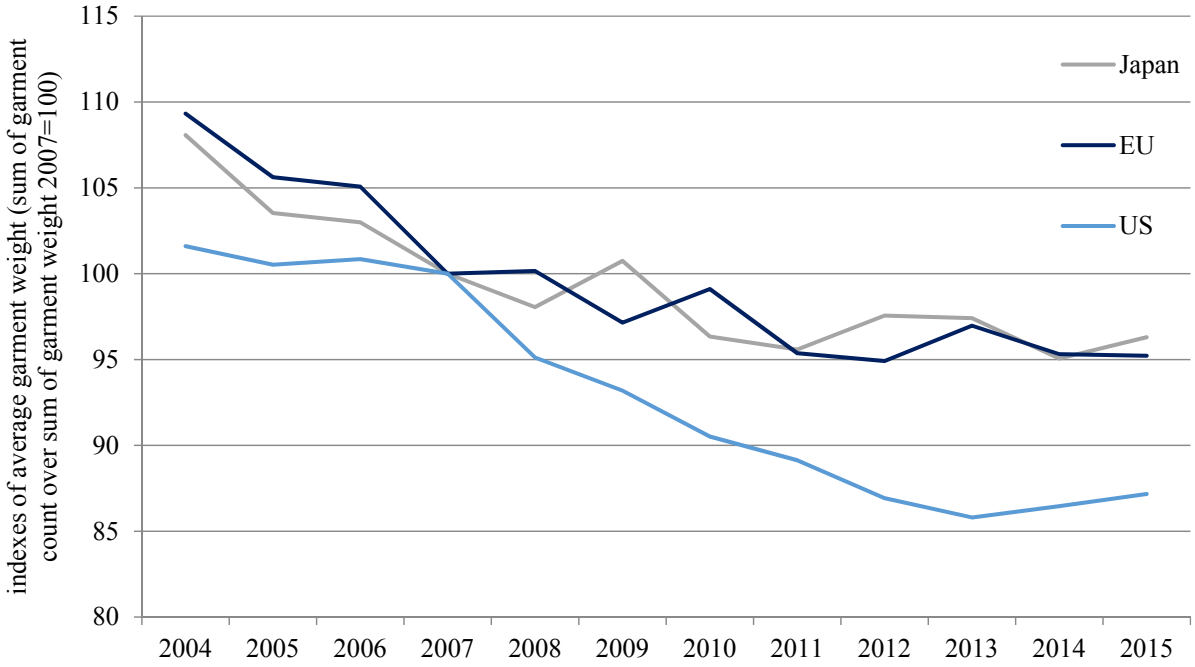

Figure 2. Change in Average Garment Weight in the U.S., E.U., and Japan.

Conclusions and Future Work

While several government agencies in the U.S. have made it easy to access data related to apparel imports (e.g., USDA ERS with their Cotton and Wool Outlook publication and the Department of Commerce's Office of Textiles and Apparel or OTEXA), parallel organizations do not exist for other countries. The motivating factor driving the work outlined in this project was to make data from the EU and Japan equally easy to access and therefore analyze.

As an exploratory effort, the data are only examined in terms of their descriptive statistics in this article. Future efforts will take these data and attempt to identify factors driving changes in apparel-related end-use demand for the major apparel import markets of the U.S., the E.U., and Japan.

The descriptive statistics analyzed in this article included those related to changes in cotton-dominant and mmf-dominant apparel weight since the peak in raw fiber consumption occurred in 2007. These data were presented by various sets of country of origin and identified Bangladesh as a standout in terms of its growth in cotton-dominant apparel exports as well as the strength of cotton-dominant share. Vietnam has been a source of growth in apparel exports, however, cotton-dominant share has been falling sharply. There has been a mix of developments in China. The U.S. has added to its sourcing China from China, while the E.U. and Japan have turned away from China.

In terms of product share, knit shirts are the most important regardless of fiber content. Woven bottoms place second. Knit bottoms have been a source of growth, taking some of the proportion from woven bottoms, but remain less than 10% of weight volume across the U.S., the E.U., and Japan.

Cotton-dominant share has been down most steeply in Japan, which is a concern if Japan can be considered a trend setter for Asia. Garments in the U.S., E.U., and Japan has all gotten about 15% lighter over the past decade and that has been another headwind for demand.

Given all of the finding that these database have facilitated, they will continue to be an important source of information regarding global end-use and therefore global mill-use. To better capture changes in the future, monthly versions of these annual databases will be developed.

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