## EXPLORING U.S. APPAREL DEMAND WITH THE LIFESTYLE MONITOR<sup>TM</sup> Jon Devine Cotton Incorporated Cary, NC

#### Abstract

The U.S. is the world's largest consumer of textiles and apparel. Bale equivalents of annual apparel imports alone have been estimated to represent nearly 13% of world cotton consumption. Given the importance of the U.S. apparel market to world cotton consumption, an understanding of U.S. apparel demand would be a valuable addition to analyses of world cotton consumption. Existing macroeconomic data sources to describe apparel demand, however, are limited in their ability to consistently relate to world cotton consumption due to the fact that they are framed in terms of dollar values. Considering that prices can change, the relationship between expressions of demand in dollar values and the underlying units, and therefore fiber volume, they represent may be inconsistent. As a result, when an overarching objective is to describe U.S. apparel demand as it relates to world cotton consumption, it may be more appropriate to model U.S. apparel demand with data framed in terms of apparel units. The purpose of this research is to examine microeconomic data from Cotton Incorporated's monthly Lifestyle Monitor<sup>TM</sup> survey as a means for describing U.S. apparel demand. Two specific questions, one focusing on consumers' decision to make apparel purchases and another focusing on the volume of apparel purchases, are investigated. Analysis first compares response frequencies for these questions against macroeconomic measures and then models responses as functions of a range of socioeconomic variables. Comparisons suggest that Lifestyle Monitor<sup>TM</sup> data can be used to inform discussion involving macroeconomic data and model results identify significant influences on apparel purchasing behavior.

#### **Introduction**

With per capita income among the highest in the world and the world's third largest population, U.S. consumers have extraordinary purchasing power and are the world's largest consumer of textile products. Per capita fiber consumption in the U.S. is estimated to be nearly 50 pounds per year, of which more than 35 pounds are cotton (International Cotton Advisory Committee, 2009). During the 2008/09 crop year, the U.S. imported the estimated equivalent of 19.1 million bales of cotton fiber in the form of textiles. This figure represents almost 20% of the world's total mill consumption of cotton in 2008/09. The vast majority of cotton textiles imported into the U.S., the equivalent of more than 14.0 million bales or nearly 13% of world consumption in 2008/09, was in the form of apparel (USDA, Economic Research Service; USDA World Agricultral Outlook Board).

Given the importance of U.S. apparel demand to world cotton consumption, data sources capable of describing U.S. apparel demand and identifying factors that influence U.S. apparel demand would be helpful for analyses of world cotton consumption. Recent economic events, which drove U.S. apparel spending lower and contributed to the 10% decline in world cotton consumption in 2008/09, reiterate the importance of such data. Developing models for apparel demand, however, is complex due to the heterogeneous nature of apparel products. Not only is there a wide range of apparel products available, but there are also wide ranges of fiber content and qualities for each product. Complicating efforts to describe apparel demand even further is the fact that apparel can be purchased in many different retail channels (e.g., department stores, specialty clothing stores, and mass merchants).

In the U.S. there are two principal macroeconomic indicators for describing apparel demand. The first is consumer spending on clothing from the Department of Commerce. These data are released as part of the monthly Personal Income and Outlay Account report and describe apparel expenditures by U.S. consumers. Consumer spending figures are derived from the Census Bureau's retail sales data, which is a second major source of data concerning U.S. apparel demand. A limitation of retail sales data, as opposed to consumer spending estimates which are based on product category (e.g., clothing), is that retail sales data represent spending according to retail channel (e.g., clothing stores or department stores). Correspondingly, a challenge with retail sales figures is separating apparel sales from sales of other items in stores such as mass discounters and department stores that sell a variety of goods. The objective of this research is to examine U.S. apparel demand in order to eventually investigate how it may relate to world cotton consumption. For these purposes, both the consumer spending and retail sales representations of U.S. apparel demand share several limitations that could inhibit efforts to model apparel consumption as it relates to

world mill consumption of cotton. The primary limitation is that both data sources are reported in terms of dollars. Given that prices can change, the ability of dollar values to represent the amount of cotton being consumed through apparel purchases may not be consistent.

For determining relationships with world cotton consumption, other data sources that are in terms of units, instead of dollar value, may be more appropriate. One data source that is available in unit terms is apparel imports. With imports estimated to compose nearly 95% of textiles available to U.S. consumers (Fox Business News, 2009), these data can provide a proxy for apparel that is eventually sold at retail. By describing the completion of retailer orders, however, import data could be seen more as a representation of retailer, rather than consumer, demand. There are lags in the time between the moment when orders for imports are placed, the time when imports arrive in the U.S., and the time when those items are eventually purchased by consumers. As a result of these lags, when there are changes in consumer demand, there may be inconsistencies in the relationship between imports and consumer demand. For example, if retailers change their management strategies and decide to carry lower inventories (as they have in current recession, contact the author for more information), the data would show lower imports even if the level of consumer demand remained constant during the time period when the adjustment was taking place.

Another limitation of existing data sources for describing consumer apparel demand as it relates to world cotton consumption is that they are all macroeconomic and, by definition, are aggregated to the national level. Being aggregated, their ability to inform discussion regarding the apparel purchase decision making process at the individual consumer level is limited.

While each of the data sources above have strengths and weaknesses for certain applications, their limitations relative to their ability to describe U.S. consumer demand for apparel in unit terms suggests that these data sources may benefit from being supplemented with alternative sources. The purpose of this research is to investigate U.S. apparel demand through microeconomic data produced as part of Cotton Incorporated's Lifestyle Monitor<sup>TM</sup>. The Lifestyle Monitor<sup>TM</sup> is a monthly survey of U.S. consumers designed to collect information on a range of consumer preferences regarding apparel and home textiles. As a resource for market intelligence, the Lifestyle Monitor<sup>TM</sup> also incorporates some microeconomic data that could potentially be used to address some of the shortfalls of the macroeconomic data described above. Specifically, this research explores the potential for data generated by the Lifestyle Monitor<sup>TM</sup> to describe apparel demand in a context of units purchased rather than dollars values and to identify factors that influence apparel purchasing patterns.

Two Lifestyle Monitor<sup>TM</sup> questions are the principal subjects of this investigation. One of the questions involves binary responses and asks consumers whether or not they made apparel purchases over the last month. Correspondingly, responses to this question can be interpreted as a representation of consumers' decisions to purchase apparel or not. A second focus addresses how much apparel was purchased in a given month. Response patterns for both questions are compared against patterns in macroeconomic consumer spending and retail sales data and then modeled as a function of socioeconomic factors. Results are discussed in the context of recent economic events and describe how the microeconomic data collected in the Lifestyle Monitor<sup>TM</sup> could be used to supplement further research involving U.S. apparel demand and its relationship to world cotton fiber demand.

This paper is organized to first provide a more in depth introduction and overview of macroeconomic indicators of U.S. apparel demand, elaborating on their derivation to provide some additional context for discussion of the Lifestyle Monitor<sup>TM</sup>. The Lifestyle Monitor<sup>TM</sup> is then described and the questions that are the focus of this research are introduced. Following their introduction, the two questions focusing on consumers' apparel purchasing decisions are analyzed in the context of macroeconomic indicators and then modeled as functions of selected socioeconomic factors. The paper concludes with discussion of the applicability of results as well as potential subjects for further research.

## Macroeconomic Data Related to U.S. Consumer Demand for Textiles

The purpose of this section is to provide an overview of some of the principal macroeconomic indicators used to describe demand for apparel in the United States. Detail concerning their origin and applicability is discussed in order to provide context for later comparison with Lifestyle Monitor<sup>TM</sup> data.

## National Income and Product Account (NIPA) and Consumer Spending Data

The National Income and Product Account (NIPA) data produced by the Bureau of Economic Analysis are the principal means of national accounting in the United States. The most well-known component of the NIPA data is Gross Domestic Product (GDP). The largest component of GDP is consumer spending, which is described in the Personal Income and Outlay Accounts. The Personal Income and Outlay Accounts contain data on consumer spending for a range of product categories.

Relevant to macroeconomic modeling of U.S. consumer demand for cotton products is the consumer spending category for clothing. Other more detailed cotton product categories are also represented in consumer spending data. Examples include consumer spending on men's clothing, women's clothing, children's & infants' clothing, and linens. As product categories become more precise, however, the Bureau of Economic Analysis has indicated that these data are primarily derived from trends and may not be appropriate for detailed analysis. The data for the category of consumer spending on clothing are derived from retail sales figures developed by the Census Bureau and are expressed in terms of annual rates. Retail sales data are collected according to business type, by NAICS code (e.g., clothing stores), while consumer spending data are collected by product category (e.g., clothing). To extrapolate estimates for personal consumption expenditures, a series of techniques called the retail control method is applied. The retail control method uses historical benchmark data, such as more comprehensive annual and quinquiennial surveys, to infer relationships between retail sales from different types of stores and consumer spending by category. These relationships, in turn, are used to develop monthly estimates for consumer spending for each category (Bureau of Economic Analysis, 2009).

#### **Retail Sales**

As mentioned in the previous subsection, the retail sales statistics published by the Census Bureau are based on sales by channel, or type of store. As a result, retail sales data can be more difficult to directly relate to overall consumer demand for apparel than consumer spending figures. To illustrate, consider the examples of retail sales by department stores and mass merchants. Both department stores and mass merchants represent a large proportion of consumer apparel purchases and retail sales at both types of stores include not only apparel but also a wide range of other items. Determining the proportion of total sales which are represented by apparel can be problematic. Nonetheless, retail sales at certain types of stores, notably clothing stores, do offer some opportunity to describe consumer apparel demand.

Retail sales figures are derived from monthly surveys of businesses. Each month approximately 5,000 businesses are selected from a national population of nearly 12,000 firms. The overall population is stratified by broad industry categories. Selected companies are assigned weights according to size and those surpassing a given threshold (according to either sales or inventory) are selected with certainty (U.S. Census Bureau, 2009).

## **Imports**

Due in large part to intense price competition, U.S. retailers have increasingly turned to foreign suppliers, and the proportion of foreign textile goods available at retail has grown dramatically over the past two decades. The ultimate source for import statistics is the Customs and Border Protection division of the Department of Homeland Security. Official trade statistics are published by the Census Bureau. The textile import figures most commonly cited in reference to textile demand, however, are those from the Office of Textiles and Apparel (OTEXA) within the Department of Commerce and those from the Economic Research Service (ERS) within the USDA. Import data available from the OTEXA are organized either according to either the harmonized tariff schedule (HTS) or multifiber agreement (MFA) categories (Department of Commerce, Office of Textiles and Apparel, 2009). Import data available from the ERS are published in the USDA's Cotton and Wool Outlook and are converted from units into pound equivalents that can, in turn, be used to describe imports in terms of estimated bale equivalents (USDA, Economic Research Service).

#### Limitations of Macroeconomic Data to Describe Consumer Apparel Demand

As outlined in the introduction, there are certain limitations inherent in the data sources described above for applications focused on examinations of U.S. apparel demand in terms of number of items purchased. A specific limitation of the data sources outlined above is that they are either expressed in dollar terms, where the relationship between dollars spent and units purchased may become inconsistent when prices change, or that the data could be seen as a representation of retailer instead of consumer demand. To address some of these shortcomings, the Lifestyle Monitor is introduced and analyzed in the following sections.

# The Lifestyle Monitor<sup>TM</sup> and Consumer Apparel Demand

To address data issues corresponding to a range of market intelligence issues, Cotton Incorporated launched the Lifestyle Monitor<sup>TM</sup> in 1994. The Lifestyle Monitor<sup>TM</sup> is a monthly survey of US consumers conducted by Cotton Incorporated. Originally introduced as a telephone survey, the Lifestyle Monitor<sup>TM</sup> began being conducted on the internet in 2008. Each month, the survey asks approximately 500 consumers a variety of questions regarding their purchasing behavior and shopping preferences. Surveys are collected from individuals who are 13-70 years old and distributed to follow Census demographic data regarding geography, age, race, marital status, and education. More surveys are sent to women (60%) than men (40%) because women tend to make more purchasing decisions involving apparel and home textiles. Surveys are conducted by Bellomy Research in Winston-Salem, NC. Respondent-level survey results are made available to Cotton Incorporated each quarter. Fourth quarter data for 2009 were not available at the time that this research was conducted

## Purchasing Responses and Measures of Macroeconomic Demand

Being a market research tool, there are questions within the Lifestyle Monitor<sup>TM</sup> related to purchasing behavior. As a result, the Lifestyle Monitor<sup>TM</sup> could potentially be used as a tool for microeconomic investigation into consumers' purchasing patterns. Among the questions contained in survey are the following:

Within the past month, have you purchased any new clothing for yourself?

Within the past month, have you purchased any new (one of fifteen product categories) for yourself?

The first question allows simple yes or no responses. Responses from the second question are derived from responses collected from fifteen different product categories (jeans, pants, shorts, athletic clothing, shirts, sweaters, suits, skirts, dresses, underwear, undershirts, bras, outerwear, socks, and sleepwear). Both questions are framed in terms of apparel units. The first question, by allowing binary response allows for insight into the decision to purchase apparel. The second question allows for insight into purchase volumes.

These two questions have been part of the core, or permanent, set of questions in the Lifestyle Monitor<sup>TM</sup> since July 2008 (data available through September 2009 when this research was conducted). As a result, with only fifteen months of data available, year-over-year comparisons and robust statistical testing against macroeconomic indicators are not yet feasible. Nonetheless, discussion is still possible regarding general movement in the patterns of response for these questions and the general patterns of movement in macroeconomic variables.

Tables 1 and 2 show the response frequencies for the two Lifestyle Monitor<sup>TM</sup> questions analyzed in this research. In the case of the question asking respondents whether or not they purchased clothing over the past month, responses were coded so that one corresponded to a positive response (yes, purchased) and zero corresponded to a negative response (no, did not purchase). For the quantity purchased question, the number of total items reported as purchased was summed across all categories. Over the fifteen months for which data are available, there were a total of 7,471 usable responses to the two questions.

	Purchased Last Month	
-	No	Yes
Responses	1881	5590
Percent	25.18%	74.82%

 Table 1. Response to Lifestyle MonitorTM Decision to Purchase Apparel Question

 Purchased Lest Month

Item	Mean	Implied Annual Frequency
Total	6.62	79.45
Shirts	1.52	18.25
Underwear	1.04	12.48
Socks	1.03	12.34
Jeans	0.57	6.90
Shorts	0.38	4.59
Pants	0.38	4.56
Athletic Apparel	0.35	4.24
Bras	0.34	4.07
Pajamas	0.20	2.41
Undershirts	0.19	2.23
Sweaters	0.16	1.89
Outerwear	0.15	1.81
Dresses	0.14	1.67
Skirts	0.09	1.02
Suits	0.07	0.93

Table 2. Response to Lifestyle MonitorTM Quantity of Apparel Purchased Question

Reponses indicate that about three out of four respondents make apparel purchases each month. This pattern of response was relatively consistent across the entire fifteen month time period (Figure 1)with the percentage of respondents reporting purchases in the previous month ranging from 70.5% (March 2009) to 80.0% (August 2008). The monthly range among respondents reporting purchases roughly corresponds to range produced by NPD survey data result from a similar "did you purchase apparel last month" question. The average number of items purchased followed the same general pattern as the percentage of respondents who made purchases. The highest number of apparel purchases reported was 7.6 (July 2008) and the lowest number of apparel purchases reported was 5.0 (May 2009). It is notable that the highest percentages regarding purchases made over the last month occurred before the credit crisis. The lowest percentages for both purchases and purchase intentions occurred in the second quarter of 2009 when year-over-year macroeconomic statistics regarding consumer spending and retail sales also marked lows.



Figure 1. Percentage of Reporting Apparel Purchases and Reported Quantities Purchased

To better inform our ideas about apparel demand in the U.S., a comparison could be made that examines response patterns in the Lifestyle Monitor<sup>TM</sup> with macroeconomic representations of apparel demand. A current limitation of Lifestyle Monitor<sup>TM</sup> data is that the series addressing apparel purchasing did not appear until July 2008. As a result, comparison of year-over-year changes is not yet possible and seasonal adjustment for the Lifestyle Monitor<sup>TM</sup> data is not yet feasible. Nonetheless, examination of month-over-month differences is possible and should provide some basis for discussion concerning potential relationships between Lifestyle Monitor<sup>TM</sup> and macroeconomic indicators of U.S. apparel demand. Figures 2 and 3 show the month-over-month changes in the percentage of positive responses to apparel purchasing questions from the Lifestyle Monitor<sup>TM</sup> as well as the month-over-month changes in consumer spending on clothing and clothing store retail sales. Since both the "did you purchase last month" and "what quantity did you purchase" questions refer to months prior to the month when the question is actually being asked, the data series are Lifestyle Monitor<sup>TM</sup> data lagged by one month. A correlation matrix more formally addressing the relationship between the macroeconomic and Lifestyle Monitor<sup>TM</sup> data is shown Table 2.



Figure 2. Month-over-Month Changes in Lagged Decision to Purchase Responses and Consumer Spending on Clothing and Shoes and Clothing Store Retail Sales



Figure 3. Month-over-Month Changes in Quantity Purchased Responses and Consumer Spending on Clothing and Shoes, and Clothing Store Retail Sales

	Consumer Spending on Clothing	Clothing Store Retail Sales	Decision to Purchase <sub>t-1</sub>	Quantity Purchased t-1
Consumer Spending	100.0%			
Clothing Store Retail Sales	88.0%	100.0%		
Decision to Purchase <sub>t-1</sub>	-19.1%	-36.0%	100.0%	
Quantity Purchased <sub>t-1</sub>	13.8%	-3.5%	63.2%	100.0%

Table 3. Correlation Matrix for Macro and Microeconomic Indicators of Consumer Apparel Demand

Notes: The only statistically significant correlations were between consumer spending on clothing and clothing store retail sales. Both relationships were significant at the  $\sigma$ =.01 level. When the quantity purchased variable was collapsed to a binary variable (=1 if quantity purchased  $\geq 1$ , =0 otherwise) the correlation between the decision to purchase and the quantity purchased was 98.3%. The slight deviation from 100.0% is thought to be due to slight differences between the apparel categories that compose the quantity purchased variable and respondent definitions of apparel. For example, respondents could also have included headgear as an apparel purchase, which is not one of the fifteen product categories.

From both the figures and the correlation matrix, it is evident that the relationships between the Lifestyle Monitor<sup>TM</sup> questions and the macroeconomic demand indicators are not significant. However, while both the macroeconomic and Lifestyle Monitor<sup>TM</sup> data sources are representative of consumer demand for apparel, there is not necessarily a theoretical reason that they should be collinear. There are important semantic differences between the macro and microeconomic variables, notably that the macroeconomic variables are in terms of dollar amounts while the microeconomic variables are in terms of apparel units.

With the dramatic changes that occurred over the past year, it could be expected that there would be some separation in measures of demand framed in dollar terms from those framed in unit terms. Both the aggressive price strategies undertaken by retailers to reduce costly inventory consumers' shift to discount mass merchants from likely contributed to such separation. Indeed, the monthly change exhibited in first few months of Lifestyle Monitor<sup>TM</sup> data appear to provide a relatively good fit to the monthly changes in the macroeconomic data, as the 2008 holiday shopping period concluded the correlation disappeared. This time period corresponded to some of the most aggressive pricing by retailers. During this time period consumers may have been purchasing clothing, but their heavily discounted purchases were not having the same effect on apparel demand figures expressed in dollar terms. As a result, the fact that there is not a significant correlation between the macroeconomic indicators and Lifestyle Monitor<sup>TM</sup> responses should not be taken as a contradiction. Instead, the fact that the data sources do not align could be taken as further evidence for the need for data that can track apparel purchases on a unit basis.

Another reason to consider Lifestyle Monitor<sup>TM</sup> data for analyses of consumer demand is that the data described by the Lifestyle Monitor<sup>TM</sup> are microeconomic. As a result, there are other analytical possibilities that can be exploited to inform characterization of factors influencing U.S. consumer apparel demand. For example, Lifestyle Monitor<sup>TM</sup> responses could be modeled as a function of consumer-level explanatory variables across the entire set of 7,471 individual responses. The following section introduces two such models and discusses what inferences can be gained in terms of understanding of consumer apparel purchasing behavior in the U.S.

## **Conceptual Model**

For both questions that are the focus of this research, consumers' apparel purchasing decisions can be thought of as a balancing of the relative costs and benefits associated with a given purchase and framed in terms of utility maximization. A given consumer will decide to make a certain purchase if the consumer sees the purchase as adding to their utility relative to the expense. As a result a positive response will be observed if a respondent perceives the utility derived from the purchase exceeded a given threshold. For the count model, this binary process is repeated for each individual purchase. Affecting the probability of a given consumer making a specific purchase is an unobservable set of factors derived from the consumer's experience and expectations. An approximation of the variables affecting consumers' apparel purchasing decisions can be motivated by existing apparel demand literature. A list of the variables considered in this analysis appears in Table 4. The motivation for particular variables' consideration, along with supporting references, appears in Table 5.

Explanatory Factor	Variable	Definition	Mean
Economic			
Confidence	U.S. Economic Outlook	=1 if optimistic or very optimistic, =0 otherwise	0.36
	Personal Financial		
Budget/Income	Outlook	=1 if optimistic or very optimistic. =0 zero otherwise	0.47
	No High School	=1 if highest level of education does not include a high	
	Diploma*	school diploma. =0 otherwise	0.12
		=1 if highest level of education is a high school diploma.	
	High School Diploma	=0 otherwise	0.29
Budget/Income		=1 if highest level of education is some college. =0	
Budget/Income	Some College	otherwise	0.29
		=1 if highest level of education is a college degree. =0	
	College Degree	otherwise.	0.20
		=1 if highest level of education is a graduate degree. =0	
	Graduate Degree	otherwise.	0.10
Budget/Income	Employment	=1 if employed. =0 otherwise.	0.59
		=1 if survey date was October 2008 or later. =0	
Budget/Income	Credit Crisis	otherwise.	0.80
Demographics	Female	= 1 if female. = 0 otherwise	0.60
D 1.			2.50
Demographics	ln(age)	Natural log of age.	3.58
	Coursesion American*	-1 if Coursesion American -0 otherwise	0.70
	Caucasian American <sup>*</sup>	-1 II Caucasian American0 outerwise.	0.70
	A fricon American	-1 if African American -0 otherwise	0.12
Demographics	Afficali Afficiali	- I II Allean American0 otherwise.	0.12
	Hispanic American	=1 if Hispanic American =0 otherwise	0.11
		=1 if not Caucasian American African American or	0.11
	Other ethnicities	Hispanic American =0 otherwise	0.07
			0.07
	Northeastern Region*	=1 if Northeastern region =0 otherwise	0.38
			0.50
	Midwestern Region	=1 if Midwestern region. =0 otherwise.	0.22
Demographics			
	Southern Region	=1 if Southern region. =0 otherwise.	0.37
		<u> </u>	
	Western Region	=1 if Western region. =0 otherwise.	0.23

Table 1	Explanatory	Variable Definitions
Table 4.	Explanatory	variable Definitions

Note: There are questions that ask respondents about their household income levels. These questions, however, are framed with the maximum income category being \$75,000 and up. The mean household income in the U.S. in 2006 was \$52,175 in inflation adjusted 2008 dollars (US Census Bureau). As a result, the income categories from the Lifestyle Monitor<sup>TM</sup> may not adequately cover higher income categories. Education is used as a proxy for income. \* Indicates the omitted case in models. When modeling dummy variables, it is necessary to omit one category in order to avoid perfect multicollinearity. Coefficients included in the model are interpreted as the difference between the omitted case and the case represented by the particular variable.

Explanatory	Variable	Expected Sign	Motivation/References	
Factor				
Economic	U.S. Economic		Carrol, Furher, & Wilcox (1994);	
Confidence	Outlook	+	Ludvigson (2004)	
	Personal Financial		Carrol Eurber & Wilcox (1004)	
Budget/Income	Outlook	+	Carrol, Fumer, & Wilcox (1994)	
	High School Diploma	+		
	Some College	+	General economic theory	
Budget/Income	College Degree	+	proxy for income	
	Graduate Degree	+		
Budget/Income	Employment	+		
Budget/Income	Credit Crisis	-	Davis (2009), The Economist (2009), Galston (2009)	
Demographics	Female	+	Silverstein & Kate (2009)	
Demographics	ln(age)	-	Cohen (2006)	
Demographics	Employment	+	General economic theory	
	Caucasian American*	N/A		
	African American	N/A		
Demographics	Hispanic American	N/A	Yen & Huang (2002), Gould (1996)	
	Other ethnicities	N/A		
Demographics	Northeastern Region*	N/A		
	Midwestern Region	N/A	Yen & Huang (2002)	
	Southern Region	N/A		
	Western Region	N/A		

Table 5 Motivation and Expected Signs for Explanatory Variables

Among the variables considered are those related to consumer confidence. Consumer confidence has been a traditional variable associated with demand formulations at the macroeconomic level. Consumer confidence can also be addressed at the microeconomic level, and variables were created from questions in the Lifestyle Monitor<sup>TM</sup> concerning attitudes regarding the state of the U.S. economy and perceptions of personal financial conditions. In both instances, respondents were presented with five potential responses including Very Pessimistic, Pessimistic, Neutral, Optimistic, and Very Optimistic. Binary variables were created from these responses where Optimistic and Very Optimistic were coded as one and all other values were coded as zero. A separate ordered logit analysis was conducted on these economic variables (not reported in this paper). In each of the models, the threshold between the two optimistic categories of response was not significant, indicating that an appropriate way to code these responses was to code Optimistic and Very Optimistic together. The correlation between personal financial outlook responses and The Conference Board's Index of Consumer Confidence is very strong and significant.

Other explanatory factors that could be motivated from economic theory are employment and income. If one is employed, they are may be more likely feel as though they have disposable income than one who is not, even if they are in the same household. As a result, it could be expected that employed persons would be more likely to make

apparel purchases than those who are not employed. Income questions in the Lifestyle Monitor<sup>TM</sup> are posed in terms of categories. The highest of these categories, however, is for household incomes of \$75,000 and more. With the median US household income more than \$50,000 dollars, there may not be sufficient variation in the income data among higher income levels. As a result, it may be preferable to use education as a proxy for income. A variable for the credit crisis is included to control for any effects beyond those impacting the budget constraint. The dramatic declines in wealth that occurred with the onset of the credit crisis, for example, could have rendered consumers more cautious in their spending.

A range of demographic variables may also provide some explanatory power. Recently, there has been increasing attention paid to the role of females in purchasing decisions. Gender and the rise of the female consumer is documented in Silverstein and Sayre's (2009) recent book and is a motivation for 60% representation by women in Lifestyle Monitor<sup>TM</sup> survey distribution. With females in charge of more purchasing decisions, it could be expected that female shoppers would be more likely to make apparel purchasing decisions than men.

Another demographic variable that may have a negative effect on apparel purchasing decisions is age. As people age, they are more likely to already have a wardrobe and less likely to purchase apparel to impress potential mates. As a result, it could be expected that the likelihood of making an apparel purchase would decline with age. Other demographic variables, such as those related to cultural or ethnic traditions or geography may also have an influence on likelihood to purchase apparel. The apparel marketing literature has found that African Americans and Hispanic Americans were more likely than Caucasians to make apparel purchases, as a result it is expected that the dummy variables controlling for the cultural differences between these minorities and Caucasians will have a positive sign. The expected signs for the regional variables are not clear, but the geographic variables are included to control for any potential effects related to these regional differences that are not otherwise controlled for in the models.

#### **Empirical Models and Results**

Given that the two questions resulted in two different types of response, one binary and the other a count, two different modeling techniques are required to analyze the effects of the variables proposed in the previous section. Given that one of the questions, that concerning consumers' decisions to purchase apparel or not, involves a binary response, a binary choice modeling technique can be used. Due to its traditional application in economic analyses and its greater resistance to outliers than the competing probit specification, a logit model was used for the decision to purchase apparel questions. A probit regression was conducted on the same set of data. The same variables were found to be significant with the marginal effect having both same signs and similar magnitudes as those from the logit model. Considering that the coefficients in a binary regression cannot be interpreted directly, marginal effects were derived. For the continuous explanatory variable controlling for age in the binary model, the marginal effect was derived from the probability distribution function of the logistic distribution. For the dummy variables, the marginal effects were derived as the difference in cumulative distribution function when the dummy variables were equal to 0 and 1. For the quantity of apparel purchased question, which involves counts of apparel items purchased, a negative binomial model was selected because evidence of significant overdispersion suggested that a Poisson specification was inappropriate.

Results from the two regressions appear in Tables 6 and 7. Virtually the same set of explanatory variables was significant in both models. The most significant variables were those for personal financial outlook, employment, the credit crisis, gender, age, and cultural background. The significance of the personal financial outlook was expected to have a positive effect in that it can be thought of as representative of a budget constraint. As consumers indicate that they are more optimistic about their financial situation, they are indicating that they perceive their budget constraint as being less restricted than those who are more pessimistic. As a result, they can be seen as having more disposable income and therefore more likely to make additional purchases. A similar explanation could be provided for the positive significant influence of having a job.

Education was included as a proxy for income and was not significant in either model. One potential reason why these variables were not more significant could be that the information that would be modeled by these variables, thought to be a representation of disposable income, was crowded out by the personal financial outlook. The strong significance of the personal financial outlook, which should include consumer perceptions not only regarding income prospects but also those concerning debts and other costs, appears to provide a better representation of the relative availability of income. Also related to the motivation of budget constraint were the variables controlling for

employment and the credit crisis. The significant negative effect of the credit crisis which firmly took hold in October 2008 suggests some enduring effects of the sharp reduction in wealth and the rise in unemployment that extend beyond the effects of the budget constraint.

The signs and significance of demographic variables also followed expectations although certain variables were insignificant in certain models. Age had significant negative effect on decisions to purchase, but was insignificant in the quantity purchased model. Being female increased the likelihood of making apparel purchases and also had a positive effect on the number of items purchased. Cultural influences appear to be stronger on the number of purchases than on the decision to purchase, with both African American and Hispanic Americans being more likely to make more purchases than Caucasian Americans while only Hispanic Americans were more likely to decide to make any apparel purchases in a given month. Perhaps controlling for other cultural differences, the geographic variables were also significant with the respondents from the Northeast being more likely than respondents from the South and Midwest to make apparel purchases.

Table 6. Lo	ogit Results: Decision to Purc	hase (N=7471)
	Coefficient	
	(b/S.E.)	Marginal Effect
Intercept	2.1995***	
	(8.33)	-0.0403
US Outlook	0.0873	
	(1.32)	0.0160
Personal Financial Outlook	0.2929***	
	(4.61)	0.0538
Credit Crisis	-0.2268***	
	(-3.28)	0.0645
Employed	0.3446***	
Linployed	(5.90)	-0.0321
High School Grad	-0.1709	
	(-1.53)	-0.0013
Some College	-0.00682	
Some Conege	(-0.07)	-0.0077
College Grad	-0.0418	
	(-0.30)	0.0158
Graduata Dagraa	0.0874	
Gladuate Deglee	(0.73)	0.0973
Famala	0.5144***	
Female	(9.19)	-0.0730
ln(aga)	-0.3962***	
III(age)	(-5.30)	-0.0192
Dloolr	-0.1022	
Васк	(-1.12)	0.0525
Hignonia	0.3037***	
Hispanic	(3.11)	0.0330
Other Ethnicities	0.1867	
(non-Caucasian)	(1.593)	-0.0350
Milanet Desien	-0.1855**	
Midwest Region	(-1.98)	-0.0385
Carth Danian	-0.2064***	
South Region	(-2.63)	-0.0162
Western Desien	-0.0866	
Western Region	(-0.992)	-0.0403
Global Diagnostics	p-value	
Likelihood ratio	<0.0001	*** significant with $\sigma$ =.01.
Wald	< 0.0001	** significant with $\sigma$ =.05

	Coefficient
	(b/S.E.)
Intercent	1.9466***
Intercept	(13.462)
US Outlook	0.1295***
05 Outlook	(3.567)
Personal Financial Outlook	0.1405
Tersonal Financial Outlook	(4.049)
Credit Crisis	-0.2314***
credit crisis	(-6.058)
Employed	0.2513
Employed	(7.615)
High School Grad	-0.0233
Thigh School Olad	(-0.399)
Some College	0.0205
Some Conege	(-0.344)
College Grad	-0.1336
College Olad	(-2.097)
Graduata Dagraa	-0.1374***
Gladdale Degree	(-1.847)
Female	-0.1781***
	(5.618)
ln(age)	0.0523***
m(age)	(-1.295)
Black	0.2635***
Diack	(5.422)
Hispanic	0.2617***
mspane	(5.131)
Other Ethnicities	0.2288***
(non-Caucasian)	(3.638)
Midwest Region	-0.1773
wildwest Region	(-3.686)
South Region	-0.1107
South Region	(-2.533)
Western Region	-0.1368
	(-2.832)
Global Diagnostics	p-value
Likelihood ratio	<0.0001
Wald	< 0.0001

 Table 7. Negative Binomial Results: Quantity of Items Purchased (N=7471)

 Coefficient

\*\*\* denotes significance at the  $\sigma$ =.01 level

### Summary & Conclusions

The U.S. apparel market is the largest in the world, with estimates indicating U.S. apparel imports represented almost 13% of world cotton consumption in 2008/09. With the U.S. apparel market playing such a role in world cotton consumption, the development of an understanding of the U.S. apparel market and factors affecting U.S. apparel demand would be an important addition to analyses of world cotton demand. Complicating such efforts is the fact that existing data for consumer demand are not available in terms of apparel units. Having data in apparel units is desirable since they likely provide a better representation of the amount of fiber being consumed than measures expressed in dollar terms. Potential issues with data expressed in terms of dollar value are that they become inconsistent gauges of unit volume with changes in prices.

A potential data source for describing apparel demand in unit terms is Cotton Incorporated's Lifestyle Monitor<sup>TM</sup>. As a market research tool, the Lifestyle Monitor<sup>TM</sup> collects data on apparel purchasing behavior and could be used as a supplement for existing measures of U.S. demand. Two questions were the focus of this research. One question examined consumer's decisions to purchase apparel and the other how many apparel items were purchased. Month-over-month changes in the response patterns for these questions were compared with month-over-month changes in national figures for consumer spending on clothing and retail sales at clothing stores. For the fifteen months that data were available for these two Lifestyle Monitor<sup>TM</sup> questions, no significant correlation was found with either of the macroeconomic data sources. The absence of a relationship, however, might have been expected given the changes in apparel prices that occurred since the credit crisis and since both consumer spending and retail sales figures are expressed in dollar terms while the Lifestyle Monitor<sup>TM</sup> data are in terms of apparel units. As such, the insignificance of the correlations among the sources could be interpreted as an example of potential inconsistencies between dollar values and unit volumes and could be considered as further motivation for the consideration of the Lifestyle Monitor<sup>TM</sup> as a data source for examining U.S. apparel demand due to its capability of describing apparel demand in terms of units.

Occurring at the microeconomic level, Lifestyle Monitor<sup>TM</sup> data also provide insight regarding potential drivers of consumer purchasing behavior. Responses to the same two questions asking whether consumers purchased apparel last month and how much they purchased last month were modeled as functions of a variety of socioeconomic and other factors. Gender, age, employment, attitudes regarding personal financial situation, and the timing of surveys in relation to the onset of the credit crisis were all significant factors helping to explain consumer apparel purchase decisions. These results largely confirmed trends that have been discussed in apparel marketing literature regarding apparel at retail, such as the dominance of females in apparel purchasing decisions and the decreased likelihood of consumers to buy apparel as they age. Results also corresponded to expectations derived from the economic literature, and suggested that the credit crisis has had an impact that extends beyond consumer budgets and has had a lasting negative effect on consumer decisions to purchase apparel.

The analyses presented in this paper should be just the first of many that take advantage of the Lifestyle Monitor<sup>TM</sup> as a tool for examining U.S. apparel demand. Future projects could attempt other modeling frameworks and involve other market research questions. In addition, as the time series lengthens, more robust comparison between macroeconomic and the Lifestyle Monitor<sup>TM</sup> questions addressed in this research will be possible. Further comparison should prove to inform greater understanding of the relationships between these data sources and prove to be a valuable supplement to discussion of world cotton consumption.

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