The Impact of Weather on U.S. Apparel Retail Sales

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As climate change is affecting climate variability, apparel retail sector is increasingly exposed to unseasonal weather (Bertrand, Brusset & Fortin, 2015). The unusual weather can change consumers' buying behavior or might cause disruptions in the supply chain, which eventually causes firms to end up with poor sales and decreases in profit. For example, Bahng and Kincade (2012) studied the relationship between weather and retail sales of seasonal apparel in Korea and found that temperature has a strong impact on the sales of seasonal apparel products. On a slightly different note, Bertrand, Brusset and Fortin (2015) studied the impact of unexpected deviations of daily temperature from seasonal patterns on apparel retail sales in France and found that seasons do not have the same level of sales impact to temperature anomalies. However, these studies have been limited to restricted samples, brands, or type of garments, for a specific period of time and in very restricted geographical areas (Bertrand, Brusset & Fortin, 2015).

To fill the gap in our understanding, this study was designed to uncover the relationships between weather and apparel retail sales in the United States. For this purpose, the secondary data analysis was performed using the national-level U.S. apparel retail sales and the weather data published by U.S. Census Bureau and National Centers for Environmental Information. Both of these organizations cover a wide chronological range of national level datasets. The monthly apparel seasonally unadjusted retail sales data from 1992 to 2015 were used as a dependent variable after eliminating the impact of Consumer Price Index (CPI). The monthly average temperature (Av), maximum temperature (Mx), minimum temperature (Mn), and precipitation (Pr) were used as independent variables. Apparel retail sales was defined as sales in millions of dollars, whereas the temperature and precipitation variables were defined by Fahrenheit and inch respectively. Moreover, both national-level population (POP) and gross domestic product (GDP) were used as control variables to minimize their impact on sales.

The following regression equation was developed for Av and the Av data were then replaced for Mx, Mn, and Pr respectively ($R_{ij}= \beta_0 + \beta_1 GDP_j + \beta_2 POP_{ij} + \beta_3 Av_{ij} + \acute{\epsilon}_{ij,}$ where, R_{ij} = U.S. apparel retail sales for month i and year j; GDP_j = Gross Domestic Product for year j; POP_{jj}= Population for month i and year j; $Av_{ij,}$ = Monthly average temperature for month i and year j; $Mx_{ij,}$= Monthly maximum temperature for month i and year j; $Mn_{ij,}$= Monthly minimum temperature for month i and year j; Pr_{ij} = Monthly average precipitation for month i and year j; and $\acute{\epsilon}_{ij}$ = Error term). To analyze impact of weather on retail sales, regression analyses was conducted. Since there are 12 months in a year and the datasets were collected from 1992 to 2015, so each equation was run for 12 times from January to December, and the total number of samples for each equation was 24.

The study result showed that the weather had statistically significant impact on apparel retail sales in the months of April, July, September, and November, after accounting for POP and GDP. More specifically, monthly average temperature as well as monthly minimum temperature had statistically significant impact in April (β_{Av} =105.049; t_{Av} =2.385; p_{Av} =0.027; β_{Mn} =121.021; t_{Mn}=2.523; p_{Mn} =0.02), September (β_{Av} =-127.485; t_{Av} =-2.15; p_{Av} =0.044; β_{Mn} =-156.40; t_{Mn} =-2.859; p_{Mn} =0.01), and November (β_{Av} =-76.431; t_{Av} =-2.415; p_{Av} =.025; β_{Mn} =-97.931; t_{Mn} =-2.751; p_{Mn} =0.012) sales. We also found statistically significant relationships between monthly maximum temperature and retail sales in April (β_{Mx} =85.185; t_{Mx} =2.154; p_{Mx} =0.044). As expected in April, sales increase with the warmer than normal temperature while decrease in September and November when the temperature is colder than normal. These results were consistent with previous studies which suggest that most significant correlation factors between clothing and temperature were observed in spring and fall season (Bertrand, Brusset & Fortin, 2015). In addition, precipitation had significant impact on July apparel retail sales (β_{Pr} =479.04; t_{Pr} =2.561; p_{Pr} =0.019). That is, with the increase in 1 inch precipitation in July, the sales will increase by $479.04.

The results showed the relationships between apparel retail sales and weather in the United States. The study found that when the temperature is higher than usual especially in April, the apparel retail sales will increase and when the temperature is lower in September and October, the sales will decrease. Again, higher precipitation in July expects higher sales in the United States. The U.S. retailers now can predict how the weather change will impact their sales and at what amount and take corrective actions to mitigate the negative impact of the weather on business activities. Moreover, the findings help U.S. apparel retailers in their strategic and financial decisions making. Further research is recommended to find out the impact of weather on sales by assessing state and company level data inside and outside the United States, wholesale and manufacture sales data, and other factors which might impact the sales i.e. mark down of price, clearance sales, and special events.

References

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